


Research Article

Knowledge, Attitudes and Practices for The Prevention of Malaria in Luanda, Angola

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Abstract

Malaria is a public health problem and is considered one of the diseases with the greatest humanitarian impact in developing countries, most of which are located in Africa, as in the case of Angola. There is a need to identify the factors underlying the maintenance of the endemicity of the disease, which motivated this research with the main objective of studying the knowledge, attitudes, and practices of individuals in relation to malaria control. A cross-sectional and descriptive study was conducted with 540 patients assisted in four primary health care facilities in Luanda, the capital of Angola, in which a statistically significant association was observed between the level of education, ownership of property, and other variables. Among the respondents, the knowledge that malaria is a public health problem ($p=0.01$) was verified. It was also found that the lower the possession of assets, the more likely the population was to stop going to the health unit due to lack of money for transportation, consultation, and to receive the diagnosis of malaria ($p=0.001$). Therefore, most of the respondents showed adequate knowledge about malaria and policies and programs for malaria control, but their attitudes and practices may be influenced by the shortcomings found in public policies and socioeconomic challenges of the country.

Keywords: Knowledge, Attitudes, Practices, Malaria Prevention

Introduction

Malaria is considered one of the oldest and most deadly diseases transmitted to humans through the female mosquito of the genus *Anopheles* [1]. Despite remarkable progress in recent years, malaria remains a major cause of illness and death in much of sub-Saharan Africa and is also a major cause of worker absenteeism, increased health care costs, decreased productivity, and avoidable school absences in Africa. It keeps families in a vicious cycle of disease and poverty [2]. The entire Angolan population is at risk of malaria, but there is a significant heterogeneity in transmission, with hyperendemicity historically observed in the northeastern provinces of Cabinda, Kwanza Norte, Lunda Norte, Lunda Sul, Malanje, and Uige. In the north, the peak malaria transmission season extends from March to May, with a secondary peak from October to November. Limited access to public health facilities, critical shortage and inequitable distribution of human resources for health, a compromised health supply chain system, and funding gaps are some of the major challenges to malaria control in Angola [3].

In 2019, Angola registered a total of 7,484,109 cases of malaria, of which 13,663 resulted in death [4]. In Angola, *Plasmodium falciparum* accounts for 92% of all cases of malaria [5], where malaria accounts for about 35% of demand for curative care, 20% of hospital admissions, 40% of perinatal deaths, and 25% of maternal mortality [6]. Although malaria is a disease that

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affects the majority of the Angolan population, the number of doctors in the country does not reach the proportion of one doctor per thousand inhabitants [7]. Investing in policies and programs to combat and control malaria with a greater approach to prevention may be a strategy which has a greater impact on the eradication of malaria in Angola. This could include actions to promote health and reduction of the disease, which implies, among other aspects, providing information for populations of endemic areas about the disease and its means of transmission [8].

Malaria case management consisting of early diagnosis and prompt treatment remains a vital component of malaria control and elimination strategies. Adherence to a full course of treatment should be promoted. Universal access to parasitological diagnosis of malaria is now possible with the use of quality assured rapid diagnostic tests [9]. The success of malaria control efforts depends largely on the level of understanding of sociocultural aspects of malaria prevention, and treatment-seeking behavior [10]. Community knowledge, attitudes, and practices towards malaria are essential to prevent infection and promote malaria-free areas, which has motivated this research.

Materials and Methods

A cross-sectional and descriptive study was carried out in a population of 8,456 respondents of 2 public and 2 private primary health care facilities located in Luanda city, the capital of Angola. The sample size calculation took into account the considerations of Luiz and Magnanini [11] and the frequency described by Thwing *et al.* [12], based on an estimated frequency of 60% for the event that was intended to be studied, with a confidence level of 95% and a margin of error of 5%. The minimum sample size was therefore 406. However, 540 respondents were selected to further increase the power of the study.

Data were collected using a structured questionnaire with 37 questions organized into 4 parts: socioeconomic and demographic data of the respondents, malaria-related knowledge, attitudes, and practices. The questionnaire was validated to allow for adjustments, which included removing irrelevant information, in a pilot study conducted with 40 people prior to the main study process. The questionnaire was completed in Angolan Portuguese, considering two local languages commonly spoken in Angola (Kimbundo and Umbundo), in a maximum time of 30 minutes. The respondents were selected by simple random sampling after written informed consent from each participant was obtained, information that was kept completely confidential. Data collected from the questionnaire were described as frequencies and percentages, and by simple linear regression using Epi info™ 7.2.2.6 software (Centers for Disease Control and Prevention - CDC, Atlanta, GA, USA). The significance

level adopted was $p \leq 0.05$. Data collection was carried out in the months of December 2022 to September 2023.

Results

Table 1 describes the socioeconomic and demographic data of the 540 respondents. We found that most respondents were aged between 18 to 30 years (68.89%). Out of the 540 respondents, 60.93% identified as female. As for the level of education, we found that 50.74% completed secondary school, while most respondents (37.22%) said they had a job at the time they took this survey. Socioeconomic status was classified based on asset ownership. This study found that 58.89% of the respondents were of low socioeconomic status (Table 1).

Table 1: Description of socioeconomic and demographic data.

| Variables | N | % |
|---|-----|-------|
| Age | | |
| 18-30 | 372 | 68.89 |
| 31-45 | 139 | 25.74 |
| 46-65 | 29 | 5.37 |
| Gender | | |
| Male | 211 | 39.07 |
| Female | 329 | 60.93 |
| Level of education | | |
| Basic education not completed | 65 | 12.04 |
| Basic education completed | 167 | 30.93 |
| Completed secondary education | 274 | 50.74 |
| Higher education completed | 30 | 5.56 |
| Never studied | 4 | 0.74 |
| Occupation | | |
| Employee | 201 | 37.22 |
| Unemployed | 81 | 15 |
| Student | 182 | 33.7 |
| Autonomous | 71 | 13.15 |
| Retired | 5 | 0.93 |
| Possession of property | | |
| Vehicle | 22 | 4.07 |
| Refrigerator | 462 | 85.56 |
| Freezer | 250 | 46.3 |
| Mobile phone | 454 | 84.07 |
| Home internet | 59 | 10.93 |
| Home ownership | 375 | 69.44 |
| Rented house | 149 | 27.59 |
| Socio-economic level | | |
| Low (ownership of three assets) | 318 | 58.89 |
| Medium (ownership of four or five assets) | 217 | 40.19 |
| High (ownership of six assets) | 5 | 0.93 |

Regarding the treatment of malaria, we found that each user knew a type of medicine to treat malaria: 67.96% of participants said that malaria is treated with Coartem, whilst 14.26% said paracetamol. A total of 15% said that there are meetings in their communities to talk about malaria prevention, and 9.26% of the respondents said that spraying mosquito repellents had taken place inside their houses. Seventy-nine percent of the respondents went to the pharmacy to purchase the drugs and took the medication, whilst 4.44% of the respondents said they bought the drugs in an informal market. Regarding malaria treatment, 77.96% of the respondents said that prices of antimalarial drugs hindered the treatment. Looking at the human malaria vector, 89.44% responded that malaria is transmitted by the bite of a female *Anopheles* mosquito, 64.07% responded that it is a mosquito, and 15.19% said that it is rat; 2.41% said that malaria is transmitted by close contact with an infected patient (Table 2).

Table 2: Respondents' knowledge about malaria, and control policies and programs.

| Variables | N | % |
|---|-----|-------|
| What is the malaria control program? | | |
| It is a television show | 78 | 14.44 |
| It is a radio broadcast | 60 | 11.11 |
| It is one of the components of the section of tropical communicable diseases, within the department of disease control of the National Public Health Office | 402 | 74.44 |
| If a person contracts malaria, what medicines are used to treat the disease? | | |
| Coartem | 367 | 67.96 |
| Paracetamol | 77 | 14.26 |
| Artesunate | 46 | 8.52 |
| Neem or <i>cura tudo</i> ^a | 50 | 9.26 |
| In your community, has there been a meeting with health authorities to talk about malaria prevention? | | |
| Yes | 81 | 15 |
| No | 459 | 85 |
| Has anyone in the last 12 months sprayed inside your house to protect against mosquitoes? | | |
| Yes | 50 | 9.26 |
| No | 490 | 90.74 |
| What do you do if you have tested positive for malaria? | | |
| I go to the drugstore to buy medicines and take my medication | 427 | 79.07 |
| I hold onto the prescription due to lack of money | 58 | 10.74 |
| I take my medication because the medicines are given in the drugstore of the health units where the consultation takes place | 31 | 5.74 |

| | | |
|--|-----|-------|
| I buy the medicines in informal market or in town squares | 24 | 4.44 |
| Do anti-malarial prices hinder access to treatment? | | |
| Yes | 421 | 77.96 |
| No | 119 | 22.04 |
| What is malaria? | | |
| It is an infectious, parasitic, and febrile disease | 223 | 41.3 |
| It is a disease caused by witchcraft | 10 | 1.85 |
| It is a public health problem | 307 | 56.85 |
| Is malaria curable? | | |
| Yes | 496 | 91.85 |
| No | 44 | 8.15 |
| How is malaria treated? | | |
| Use of medication | 375 | 69.44 |
| By religious practices | 55 | 10.19 |
| Use of herbs | 66 | 12.22 |
| Malaria is incurable and has no form of treatment | 44 | 8.15 |
| What is the malaria vector in humans? | | |
| Cockroach | 45 | 8.33 |
| Fly | 67 | 12.41 |
| <i>Anopheles</i> mosquito | 346 | 64.07 |
| Mouse/rat | 82 | 15.19 |
| How is malaria transmitted? | | |
| By transfusion of infected blood | 27 | 5 |
| During pregnancy from the infected mother to the fetus | 14 | 2.59 |
| During unprotected sex | 3 | 0.56 |
| Close contact with an infected patient | 13 | 2.41 |
| Through the bite of the female <i>Anopheles</i> mosquito | 483 | 89.44 |

^aa natural treatment used to cure all illnesses.

Table 3 describes the respondents' knowledge of the strengths and weaknesses of the policies, programs and budget applied to malaria control, with the aim of eradicating malaria in any community or reducing the number of patients and deaths. As malaria is one of the main causes of death in Angola and given the economic difficulties faced by the majority of the population, we seek to know from respondents whether antimalarials should be distributed in health units free of charge, as is the case with drugs for tuberculosis and HIV/AIDS. The overwhelming majority of respondents (98.52%) believed that antimalarials should be distributed free of charge in health facilities (Table 3).

Table 4 describes the respondents attitudes towards malaria when they had symptoms of the disease: 61.48% of the respondents reported self-medication. Taking into account the time to seek health services upon identifying the main symptoms of malaria, 74.07% of the respondents seek

services after two days, while 13.7% seek health services after one week. A total of 59.44% of the respondents had already stopped going to the health service due to lack of money to pay for transportation to get to the hospital, pay for consultations, and perform exams. Those who opt for private health services instead of seeking public service were questioned about the reasons, and 36.48% reported not seeking public health service because hospitals are always full and 21.11% said that health professionals in public service mistreat patients (Table 4).

With regards to malaria prevention, specifically individual protection measures, 42.59% of the respondents reported using a mosquito net treated with long-lasting insecticides, with the majority (48.52%) having purchased it with their own money, and a minority having obtained it by donation (24.44%). One of the most effective measures in the fight against malaria is the use of a mosquito net, affirmed by 72.96% of the respondents, despite some revealing that they don't use one. Considering the respondents who did not use nets, a total of 4.63% said that they did not use nets due to lack of money (Table 5).

Table 3: Respondents' knowledge about strengths and weaknesses of policies, programs, and budget applied to malaria control

| Variables | N | % |
|---|-----|-------|
| Do you think malaria continues to cause deaths because part of the population does not have access to health services? | | |
| Yes | 512 | 94.81 |
| No | 28 | 5.19 |
| What are the reasons for there being so many deaths due to malaria? | | |
| Because health facilities are far from the population's homes | 160 | 29.63 |
| Because some rural and urban areas have few health facilities | 211 | 39.07 |
| Because some populations in urban and rural areas only receive health care when a team of health professionals goes to meet them | 141 | 26.11 |
| The fact that part of the population is not covered by public health services is not the reason for the numerous deaths from malaria | 28 | 5.19 |
| Do you think that antimalarials should be free of charge, as it is the case with drugs for tuberculosis and HIV/AIDS? | | |
| Yes | 532 | 98.52 |
| No | 8 | 1.48 |
| Do you think that the lack of ICE* on preventive measures favors the increase in the number of patients with malaria and deaths? | | |
| Yes | 499 | 92.41 |
| No | 41 | 7.59 |

*ICE= information, communication, and education for health (ICE).

Table 4: Respondents' attitudes about malaria control and transmission.

| Variables | N | % |
|---|-----|-------|
| What steps are taken when you have signs and symptoms of malaria? | | |
| Self-medication | 332 | 61.48 |
| Go to public health service | 127 | 23.52 |
| Look for a religious entity to pray and wait for divine healing | 4 | 0.74 |
| Wait for the symptoms to disappear without taking any action | 12 | 2.22 |
| Look for private health facilities because they provide better health service | 65 | 12.04 |
| If you had symptoms of malaria, what health service would you prefer? | | |
| Private health service | 419 | 77.59 |
| Public health service | 121 | 22.41 |
| Why do you opt for private rather than public health services when you have symptoms of malaria? | | |
| In public health service, professionals mistreat patients | 114 | 21.11 |
| Because public health services are always full | 197 | 36.48 |
| Because in private health services laboratory exams are reliable | 108 | 20 |
| Part of the population seek for public health services because they have no other option | 121 | 22.41 |
| When you feel you have symptoms of malaria, how long do you wait before seeking medical services? | | |
| I go to the hospital straight away | 27 | 5 |
| One to two days | 400 | 74.07 |
| One week | 74 | 13.7 |
| Two weeks if symptoms persist | 39 | 7.22 |
| Have you ever missed going to the health unit due to a lack of money for transport and for medical consultation and examination? | | |
| Yes | 321 | 59.44 |
| No | 219 | 40.56 |

Finally, there was a statistically significant relation between the level of education, and the variables of the knowledge that the malaria control program is promoted by the National Public Health Office ($p=0.01$), and the knowledge that malaria is a public health problem ($p=0.01$). There was also a statistically significant association between possession of assets and the variable in which they have already stopped going to the health unit due to lack of money for transportation, payment of consultation, and examination ($p=0.001$), and, in the report that public hospitals are always full ($p=0.01$) (Table 6).

Table 5: Respondents' practices about malaria control and transmission.

| Variables | N | % |
|---|-----|-------|
| What personal protective measures do you take? | | |
| Untreated mosquito net | 57 | 10.56 |
| Repellents | 67 | 12.41 |
| <i>Sheltox</i> (mosquito repellent spray) or <i>dragão</i> (mosquito coil) | 162 | 30 |
| Use of luminous electrical appliances that attract and kill mosquitoes | 8 | 1.48 |
| Wear long sleeves, especially at night | 4 | 0.74 |
| Use of millimeter nets on doors and windows | 12 | 2.22 |
| Mosquito net treated with long-lasting insecticide | 230 | 42.59 |
| How did you acquire your mosquito net? | | |
| It was donated by the health unit | 132 | 24.44 |
| It was bought | 262 | 48.52 |
| Did not reveal the reason for not having mosquito net | 146 | 27.04 |
| If you do not use a mosquito net, why not? | | |
| For lack of money | 25 | 4.63 |
| Because I feel short of breath inside a mosquito net | 41 | 7.59 |
| Because I don't like it | 80 | 14.81 |
| Despite not using a mosquito net, they state that using it is one of the most effective measures to avoid malaria | 394 | 72.96 |
| What collective protection measures are practiced in your neighborhood? | | |
| Indoor spraying | 2 | 0.37 |
| Stagnant water removal | 41 | 7.59 |
| Fumigation | 12 | 2.22 |
| Waste collection | 269 | 49.81 |
| All of the above | 1 | 0.19 |
| None of the above measures | 215 | 39.81 |

Table 6: Simple linear regression between education level, asset ownership, and other variables.

| Variables | p* |
|--|-------|
| What is the malaria control program? | |
| It is one of the components of the section of tropical communicable diseases, within the department of disease control of the National Public Health Office. | 0.01 |
| What is malaria? | |
| It is a public health problem | 0.01 |
| Have you ever missed going to the health unit due to lack of money for transport or for medical consultation and examination? | |
| Yes | 0.001 |
| When you feel the symptoms of malaria why don't you immediately seek public health services? | |
| Because hospitals are always full | 0.01 |

Discussion

The overall data from our survey showed that 60.93% of the respondents were females, a result similar to that found in a study conducted in Zimbabwe [13], which had 60.3% of women as respondents, demonstrating that women seem to be more likely to seek health care as malaria symptoms arise. In our study, education level was shown to be able to influence the fight against malaria ($p=0.01$) (Table 6), in which the majority of participants (50.74%) had completed high school, similar to a study conducted in Cameroon, in which 69.8% of the women, respondents, had also completed high school [14], unlike a study conducted in Kenya [15], in which only 15.6% of participants had completed high school. We also found a statistically significant association between possession of assets and those who stopped going to hospitals due to lack of money for transportation, payment of consultation and examination ($p=0.001$). Once again, this highlights poverty as one of the factors that prevent the control or elimination of malaria, considering that most respondents in our study were classified as belonging to a low socioeconomic level (58.89%), a social situation commonly found in sub-Saharan Africa [16].

The knowledge of the population about how to treat malaria can lead them to adopt dubious practices when facing the disease. Something similar occurred in our study, in which 14.26% of respondents stated that malaria can be treated with paracetamol, and a similar result could be found in a study conducted in Cameroon [17]. Communication or knowledge transmission is one of the means that leads the population to adopt or comply with prevention measures. Our study showed that the majority of respondents (85%) had never received health education on malaria prevention, compared to 15% who reported that they had received education on malaria prevention. A better rate was found in a study conducted in Zimbabwe [18], where 75% of participants had already received some type of health education on malaria, which furthers the recognition that community health dialogue sessions can help broaden understanding of how best to prevent malaria [19].

Because of economic challenges faced by the Angolan population, 79.07% of the respondents reported that they had received a prescription for treatment at the hospitals and bought some of the drugs from commercial drugstores or through the informal trade with their own financial resources, often not completing the treatment due to the scarcity of these resources. Such conditions can be further demonstrated in the fact that 59.44% of respondents in our study revealed having difficulties in accessing health services due to lack of money for transportation and for the payment of consultation and diagnostic tests. In other studies conducted in Africa, difficulties in accessing medical services are reported [20], where the fear of not having money to afford malaria

treatment [21] and the lack of financial resources are recurrent challenges to malaria treatment [22]. Most of the population living in endemic areas are exposed to the vector for malaria, the female *Anopheles* mosquito, which leads a part of the population to doubt the cure of malaria, since the population is very likely to be re-infected. Most of the respondents who participated in our study (91.85%) believe in a cure for malaria, showing that there are those who believe that malaria can be prevented, curable, but it can also promote high rates of morbidity and mortality in populations vulnerable to the disease [23].

Knowing what the vector for malaria is is very important, as it helps the population to find methods to fight against it. In our survey, 64.07% stated that the vector for malaria is mosquito, with 89.44% saying that transmission occurs only by the bite of the female *Anopheles* mosquito, information that seems to be the most prominent in African countries [24],[25]. In contrast, our study revealed that the belief of malaria being transmitted by flies, rats and cockroaches corroborates the data of other studies conducted in Africa [17],[26]. Once again this demonstrates the need for the promotion of health education actions for citizens, since the mistaken knowledge about the means of malaria transmission can contribute to the continuation of malaria cases among the population. As for the dispensation of medicines, 98.52% of those who participated in our survey were of the opinion that antimalarials should be distributed free of charge to the population through health units. This is justified on the premise that malaria treatment can be successful if the population has greater access to antimalarials, provided free of charge through regular actions designed and promoted by government health authorities [27].

Regarding the time to seek medical services after the first suspected symptoms of malaria, in our study, there were those who reported seeking health services after one week of symptoms (13.7%), whose result emerges as an element to be better addressed by health programs, considering that the delay to start treatment increases the possibility of complications and death [28]. A worrisome fact found in our research is also related to the practice of self-medication, performed by 61.48% of respondents. Such practice is common among individuals living in malaria transmission areas [27],[29]. Although there are reports of individuals seeking health facilities upon the first symptoms of malaria [30], there have been cases of symptomatic malaria patients who did not seek any type of medical attention [31]. As for protective measures, 42.59% of the respondents in our study reported using insecticide treated bed netting, a practice often found in malaria susceptible populations [18],[32].

However, a minority of respondents in our study (24.44%) who said they use nets acquired them through donation, which demonstrates the need for improved actions

that provide the population access to nets: mass distribution campaigns may be a strategy that allows the majority of the population to use them. This same reality was observed in other African countries [33, 34]. Finally, in our study, there are those who revealed that they do not use an insecticide-impregnated net because they do not like this method of protection, while others reported feeling breathless when using a net. These results are similar to those of other studies, in which participants stated that they do not use one due to the discomfort caused [30, 35], which shows that there is a need to promote activities to raise awareness among populations living in malaria-endemic areas, regarding the importance of proper use of this method as a measure to prevent the disease.

Conclusion

Most of our respondents showed adequate knowledge about malaria and the policies and programs available for disease control in Angola, but there were those who still responded that malaria is a disease resulting from witchcraft and that it is transmitted by vectors such as flies and rats. We identified respondents who adopt good attitudes and practices towards malaria, such as the use of mosquito nets treated with long-lasting insecticide and going to the health unit immediately upon the appearance of the first symptoms of the disease, a fact that contributes to reduction of malaria cases in the country. But we also found a considerable number of respondents who do not have positive attitudes and practices towards malaria, a fact that draws attention to the need for better information transmission, education, and communication on malaria, in order to improve the population's knowledge and influence changes in attitudes and practices. However, part of the surveyed population showed limitations in complying with important practices for reducing the incidence of patients and deaths from malaria due to limited access to healthcare facilities and malaria drug treatment scheme, since most of the study respondents are living under low socioeconomic conditions. There is an urgent need to discuss public health solutions to face the challenges of malaria control.

List of abbreviations

HIV/AIDS - Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome

ICE- Information, Communication, and Education for Health

Ethical approval and consent to participate

The project was evaluated by the Ethics Committee on Human Research of the Catholic University of Angola. It was approved under protocol n. 69, on 24 July 2020. Written informed consent was obtained from each participant. The information obtained was kept in total confidentiality.

Consent for Publication

The authors consent to the publication of the results.

Availability of data and materials

The data used and/or analyzed during the current study are available with the corresponding author upon reasonable request.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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Authors' Contributions

Isabel Sobral contributed to data collection, data analysis, and drafting of the manuscript. Marli Stela Santana supervised the study and participated in the drafting of the manuscript.

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