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Malaria prevention: Knowledge and practices of heads of households in the Kenya health zone in Lubumbashi in the Democratic Republic of Congo

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Abstract
Introduction: WHO highlights major gaps in prevention coverage, particularly in sub-Saharan Africa. I'The objective of our study was to study the knowledge and practices of heads of households in terms of malaria prevention in the Kenya health zone.
Methods: Our study was carried out in households by a team of 2 people, from October 25 to October 30, 2021 using an interview guide given to heads of households in the Kenya health area. This is a qualitative descriptive cross-sectional study.
Results: Our investigation reveals that6 (75%) of the households surveyed were headed by men,the population aged 20 to 24 was the largest age group with 50%,5(62.5%) heads of the households surveyed were married and 2 households (25%) have heads who do not carry out any income-generating activity. The analysis of the speech of the participants in this research shows that the notions on malaria are relatively well known among these actors who often cite the seasonality, the clinical signs as testified by these remarks: "Yes, it is a disease of birds that we call MUSANVU, Often it is during rain that it happens because of mosquitoes; I know there are: Fever, Headaches, Chills. The discourse of the heads of households indicates that the use of LLINs helps to provide good protection in the fight against malaria, as evidenced by this statement: "The mosquito net; the Muskito, Insecticides; I often use insecticides, mosquito nets and muskitos,'. Many of the participants do not recognize the causes by confusing them with how you get malaria, which is the bites; *Stagnant water that provokes mosquitoes and when they bite us we get sick".*
Conclusion: The Kenya Health Zone population has an acceptable level of malaria knowledge and control practices. Public awareness programs should improve this situation for the well-being of the population.

Keywords: prevention, malaria, knowledge, practices

Introduction

WHO recommends a set of proven prevention approaches, including the use of insecticide-treated mosquito nets, indoor spraying of insecticide and preventive treatments for the most vulnerable groups, namely pregnant women, children under five and infants. "The tools recommended by WHO have made measurable progress in the fight against malaria," said Dr Margaret Chan, WHO Director-General. "However, we need to give greater impetus to prevention, especially in Africa, the continent with the highest disease burden [1].»There are between 300 to 500 million clinical cases with 1.5 to 2.7 million deaths in sub-Saharan Africa, including 1 million children under 5 years old. [2]. In Europe, France is the most affected country with 437,000 cases of malaria in 2016, including more than 0.875 with Plasmodium Falciparum; 0.116 severe attacks and 5 deaths per year [3]. And according to the World Health Organization (WHO), the total number of malaria cases has decreased from 238 million in 2000 to 229 million in 2019 and the number of deaths estimated at 40,900 in 2019, of which 0.67 concern children under the age of 5 years [4]. During this same period, the population of sub-Saharan Africa, which accounts for more than 0.9 of the global burden of malaria, ranges from 665 million to more than one billion inhabitants. [5]. In 2015, the European Region successfully interrupted autochthonous transmission of malaria and was declared malaria-free the following year. The region has retained its status and countries at risk of reintroduction of the disease are stepping up efforts to protect their populations from the risk of re-exposure to malaria [1].

Africa remains the most affected continent with approximately 93% of cases recorded against 5% in Southeast Asia and 2% in the Mediterranean region [6]. In 2015, 10 countries (Burkina Faso, Gambia, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Chad and Togo) adopted seasonal malaria chemoprevention and started implementing it [1]. In Cameroon, an estimated 41% of the malaria population, children and pregnant women being the most affected [7]. For several decades, Cameroon has been deploying multifaceted means to fight against malaria, in particular with the free care of children aged 3 to 59 months suffering from uncomplicated malaria, free Insecticide Impregnated Mosquito Nets (MII), Preventive Treatment Intermittent (IPT) for pregnant

women and Seasonal Malaria Chemo-Prevention (CPS) taking place each year for four successive months in 4 monthly cycles and free of charge(8).In recent years, the Director-General of WHO has certified the elimination of malaria in the following seven countries: United Arab Emirates (2007), Morocco (2010), Turkmenistan (2010), Armenia (2011), the Maldives (2015), Sri Lanka (2016) and Kyrgyzstan (2016). Certification is granted by WHO when a country declares zero indigenous cases of malaria for at least three consecutive years [1]. According to the 2016 World Malaria Report, the number of malaria cases fell by 21% globally between 2010 and 2015 and deaths by 29% over the same 5-year period. In sub-Saharan Africa, malaria incidence and mortality rate fell by 21% and 31%, respectively [5]. Other regions have made great progress in the fight against malaria, but the disease remains a serious threat to public health. In 2015, malaria was responsible for 429,000 deaths worldwide and there were 212 million new cases. A child died of malaria every two minutes [1]. “Any death attributable to preventable or treatable malaria is simply unacceptable,” said Dr Pedro Alonso, Director of the Global Malaria Program at WHO. "Today, we urge countries and partners to accelerate the pace of action, particularly in low-income countries with high malaria burdens."(9)In May 2015, the World Health Assembly endorsed the Global Technical Strategy for Malaria 2016-2030, a 15-year blueprint for all countries striving to control malaria and eliminate malaria. Disease [10].

In the Democratic Republic of Congo, according to thick film results, the prevalence of malaria (23% for all children aged 6-59 months) increases with age, from a minimum of 12% to 6- 8 months and 9-11 months to a maximum of 28% at 36-47 months and 27% at 48-59 months. Boys (23%) would be very slightly more affected than girls (22%). The estimated prevalence shows strong variations depending on the province (Map 1): it is in the Kivus that the proportion of positive children is the lowest (5% in North Kivu and 10% in South Kivu), followed by Bandundu (14%), Kinshasa (18%) and Equateur (19%). Conversely, the proportion of positive children is highest in the Kasaïs (29% in Kasaï-Oriental, 32% in Kasaï-Occidental), in Katanga (32%), in Maniema (34%) and especially in Eastern Province (38%). The proportion of positive children decreases considerably with the improvement in the level of education after primary school. Indeed, if 26% of children of mothers with primary education are positive, this proportion is only 8% when the mother has a higher level of education. [11]. In sub-Saharan endemic areas, malaria is one of the major causes of hospitalization and death, especially among children under 5 years old. In addition to the loss of human lives, malaria causes affected people to reduce activity for several days and affects the economy by reducing the gross national product and hindering children's schooling and social development. [12]. It therefore causes the poverty of populations in endemic areas. In the Democratic Republic of Congo, malaria is the leading cause of infant and child morbidity and mortality. It is responsible for 67% of outpatient consultations and 47.3% of deaths of children under 5. [13]. Indeed, a Congolese child under the age of 5 experiences between 6 to 10 episodes of fever of malarial origin per year.(14). The latest WHO report highlights major gaps in prevention coverage, particularly in sub-Saharan Africa. It is estimated that in 2015, 43% of people at risk in the region were not protected by mosquito nets or indoor insecticide spraying. About 69% of pregnant women in 20 African countries did not have access to at least 3 doses recommended by WHO for preventive treatment [1]. In Lubumbashi, malaria is still relevant and its incidence was recently estimated at 17.82%.[15], and hospital mortality is around 28.32% [15]. Most of the severe cases and deaths due to malaria in under-equipped environments generally arrive late at the hospital after an unsuccessful attempt at self-medication, whereas an early arrival and identification of the risk factors for death avoid often lead to a fatal outcome [16]. Beyond these factors, non-compliance with care recommendations by healthcare personnel at the level of health structures would probably contribute to treatment failures and the emergence of resistant strains of plasmodium falciparum to the usual antimalarials. [17]. Malaria is a real public health problem in our environment requiring urgent solutions. The general objective of this research is to assess the knowledge and practices of heads of households in terms of malaria prevention in the Kenya health zone; specifically: Determine the socio-demographic characteristics of respondents; Assess the level of knowledge of household heads on malaria in the Kenya health zone, Describe the practices of household heads in terms of malaria prevention measures in the Kenya health zone, Assess the knowledge of household heads on the causes of malaria in the Kenya health zone.

Population and Methods

Study framework

1. General information about HZ Kenya

The ZS Kenya is an urban-rural entity comprising the entire urban commune of Kenya and part of the Annex commune. It has become a unit that is part of the health district of Lubumbashi thanks to the presence of HGR Kenya. The latter was built around 1954-1955 with the aim of providing the best care to tuberculosis patients, most of whom were in the Kenya commune. The policy of the colonial authorities in the field of health was, among other things, the eradication of this disease, which had become an inevitable social scourge. The growth of these activities will give rise to the creation of other services, thus increasing its minimum package of activities (PMA). Later, services such as maternity, pediatrics, internal medicine, surgery and promotional and preventive activities will supplement the complementary package of activities (PCA). The presence within it of a highly qualified medical staff is a major asset for its development. From then on, this hospital structure becomes a HGR welcoming all the cases depositing the technical platform of the structures evolving in the health zone of kenya. Currently, HZ Kenya includes thirteen health areas including three areas in the rural part, Mabila, Upemba, Kyubo, Lubumbashi, Musofi, Moba, Casop, Kenya1, Kenya2, Tingi tingi, Kalebuka, Kasungami

Kilenge. ZS Kenya is headquartered within HGR Kenya and is limited to: this hospital structure becomes an HGR welcoming all cases depositing the technical platform of the structures operating in the health zone of kenya. Currently, HZ Kenya includes thirteen health areas including three areas in the rural part, Mabila, Upemba, Kyubo, Lubumbashi, Musofi, Moba, Casop, Kenya1, Kenya2, Tingi tingi, Kalebuka, Kasungami Kilenge. ZS Kenya is headquartered within HGR Kenya and is limited to: this hospital structure becomes an HGR welcoming all cases depositing the technical platform of the structures operating in the health zone of kenya. Currently, HZ Kenya includes thirteen health areas including three areas in the rural part, Mabila, Upemba, Kyubo, Lubumbashi, Musofi, Moba, Casop, Kenya1, Kenya2, Tingi tingi, Kalebuka, Kasungami Kilenge. ZS Kenya is headquartered within HGR Kenya and is limited to:

- To the north: the Mumbunda health zone with which it is separated by boulevard katuba
- To the northeast: ZS Kamalondo
- To the east: ZS Kapemba
- In the south-east: ZS Kisanga
- To the west: ZS Katuba
- To the south-east: ZS Kipushi

2. Study population and sampling

Our field of study covers all the heads of households who frequent the Kenya health HZ. In order to allow us a good collection of data, we opted for a sampling by convenience based on an interview of the 8 respondents including 4 focus groups and 4 individual interviews.

3. Target population

The heads of households in the Kenya health area in the Kenya health zone.

4. Selection criteria

Data from heads of households in the Kenya health zone who were part of the strata and who agreed to answer our questionnaire are selected for this study.

- **Inclusion criteria:** All heads of households who agreed to participate in our interview
- **Non-inclusion criteria:** All heads of households who refused to participate in our interview and who do not live in Kenya.

5. Themes under study

Table 1: Breakdown of themes

Themes	Sub themes	Levels
1. Knowledge about malaria prevention	❖ Knowledge about malaria	- Perform individual interview; - Wait for responses.
	❖ Knowledge of the causes of malaria	- Perform individual interview; - Wait for responses.
	❖ Knowledge of means of protection against malaria	- Perform personal interview
	❖ The signs of malaria	- Perform personal interview
1. Practice on prevention	❖ Regular use of the mosquito net No Yes	- See if the mosquito net is installed

6. Data collection techniques

We used the interview technique through an interview guide that was given to heads of households in focus groups and in individual interviews.

7. Data sources, period and type of study

We collected our data in the households by a team of 2 people, from October 25 to October 30, 2021 using an interview guide given to the heads of households in the Kenya health area. This is a qualitative descriptive cross-sectional study.

8. Data processing and analysis

This work uses the following tools:

- Microsoft office (Word 2010): for work entry
- Epi-info (7.2.0.1.): for data analysis and encoding.
- QDA Miner lite: for in-depth analyses.

Results

1. Sociodemographic characteristics of the people surveyed

1.1. Respondents by gender

This figure shows that 6 (75%) of the households surveyed were headed by men, and 2 (25%), by women with aSex Ratio =3.

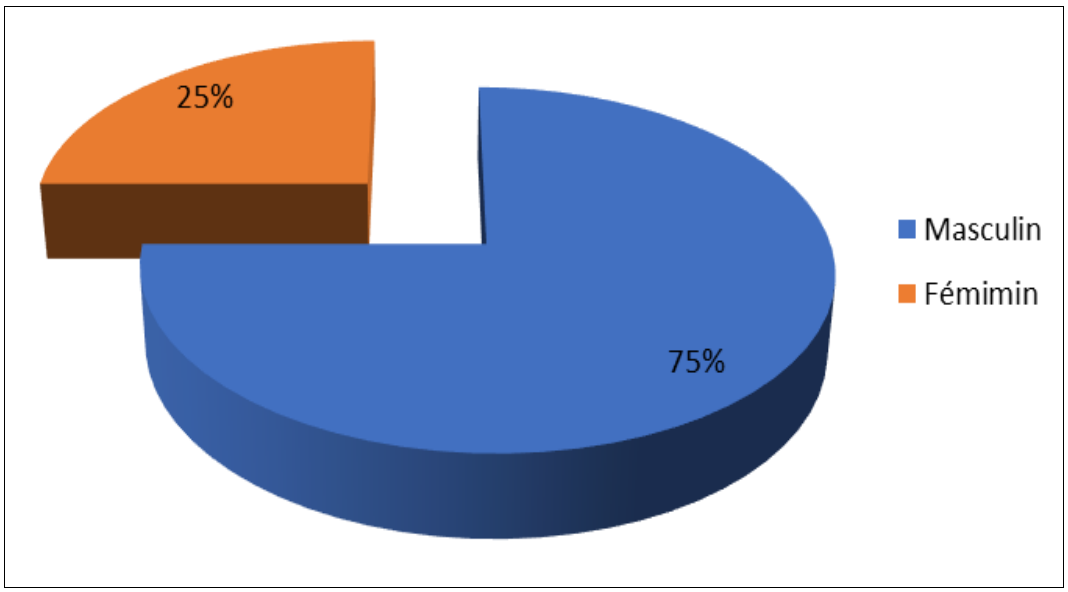

Fig 1: Distribution of respondents by gender

1.2. Respondents by age group

Table 2: Distribution of respondents by age group

Age range	Frequency	Percentage
20 – 24	4	50
24 – 28	2	25
28 – 32	2	25
Total	8	100

The population aged 20 to 24 was the largest age group with 50%. The average age was 20 ± 3 years for heads of households.

1.3. Respondents by marital status

Table 3: Distribution of respondents according to marital status

Civil status	Frequency	Percentage
Single	3	37.5
Married	5	62.5
Total	8	100

This table reveals that 5 (62.5%) heads of households surveyed were married and 3 (37.5%) are single..

1.4. Respondents by level of study

Table 4: Distribution of respondents according to level of study

Study level	Frequency	Percentage
Any	1	12.5
Humanitarian	2	25
University	5	62.5
Total	8	100

Respondents who said they had never attended school represented 12.5% of heads of household.

1.5. Respondents by profession

Table 5: Distribution of heads of households according to their professional occupation

Profession	Frequency	Percentage
Liberal activity	3	37.5
Any	2	25
Official	1	12.5
Private sector	2	25
Total	8	100

This table shows that 2 households (25%) have heads who do not exercise any income-generating activity and 3 (37.5%) of household heads exercise a liberal activity, 25% are employed in private companies, and 12 % or 1 respondent is a civil servant.

2. Knowledge of household heads about malaria

The analysis of the speech of the participants in this research shows that the notions on malaria are relatively well known among these actors who often cite seasonality, the clinical signs as testified by these remarks: "Yes, it is a disease of birds that we call MUSANVA, Often it is during rain that it happens because of mosquitoes; I know there is:

- *Fever*
- *Headache*
- *Chills*
- *The cries of the child that's why we talk about bird disease*
- *I use the mosquito net and also the LUENYI and the BICOTSCHI COTSCHI"*Men EI CMZS Kenya

*"For me, it's when I see fever, headaches and fatigue; I know it's fever, headache, lack of appetite; There is the fever, the cries of the children, the tears, the shivers, pain in the bones; Fever, cough, headache, body aches, often the cries of children at night, they hardly sleep, nausea. Yes, it is a mosquito disease. Yes, it's a mosquito disease that manifests itself during the rainy season and if you don't sleep under a mosquito net you get sick, but sometimes even when you sleep under a mosquito net you can get sick. Yes, it's true that we've always said it's mosquitoes but I think it's not necessarily just that. Yes, it is a disease of mosquitoes which manifests itself by cries often in children according to the experience that I have. »*Men FG CMZS Kenya

3. Malaria prevention measures

The discourse of the heads of households indicates that the use of LLINs helps to provide good protection in the fight against malaria, as evidenced by this statement: "The mosquito net; the Muskito, Insecticides; I often use insecticides, mosquito nets and muskitos," Men EICMZS Kenya

*"The best way is just the mosquito net, the muskito and the insecticides just come complete, The insecticides, the mosquito net and the muskito, The mosquito net, the muskito; Sanitation of the environment, muskito, insecticide, mosquito net Yes, throughout the rainy period but not too much when it starts to get hot; No, I don't have enough and it bothers my face too much; Yes, every night"*Men FGCMZS Kenya

4. Causes of Malaria

Many of the participants do not recognize the causes by confusing them with how you get malaria, which is the bites; here are their testimonies in his words: "I know it comes when mosquitoes bite us; *Stagnant water that causes mosquitoes and when they bite us we get sick. So it was the mosquitoes that caused that. »*Women EICMZS Kenya; 22 years old.

*"When we are bitten by mosquitoes at night; I know that it is by mosquito bites especially during the rainy season because of stagnant water, grass growth and lack of maintenance; Mosquitoes but also dirty hands especially children when they play with dirty things, food too, when you don't eat well this also causes malaria; I just know it's from mosquito bites. »*Men FGCMZS Kenya

Discussion

1. Sociodemographic characteristics of the people surveyed

A. Sex

Only 2 (25%) of the households surveyed were headed by women contrary to the results Davos DANVENE SANGBA [30] who found 2.20% of households surveyed were headed by women [30]. This huge difference could come from the fact that in Congolese culture, it is more honorable for a woman-mother to have her household headed by a man and therefore, information bias on this subject could creep into the survey.

B. Study level

12.5% of household heads said they had never attended school. This observation differs from the observation made in a study by Mukalay *et al* [32]. who puts this proportion at 23.2% in a district of Lubumbashi[32] and still differs from the results of the EDS-RDC 2007 which estimates it at 34.9% in urban areas [33]. AndKoine Maxime

Drabo *et al* [34] in his study they found thatthe respondents who declared that they had never attended a school represented 60.6% of the heads of household and this difference is explained in relation to the sample size their sample size was larger than ours [34].

C. Profession

25% of household heads do not carry out any gainful occupation; proportion lower than that published by the EDS-DRC 2007, which is 36.5%. The average household size of 8 people noted in our study is not the same as the national average presented in the EDS-RDC 2007 for the urban environment [32].

Knowledge of household heads about malaria

The analysis of the speech of the participants in this research shows that the notions on malaria are relatively well known among these actors who often cite seasonality, the clinical signs as testified by these remarks: "Yes, it is a disease of birds that we call MUSANVA, Often it is during rain that it happens because of mosquitoes" Men EICMZS Kenya.This result is consistent with that recorded by Seck *et al*. (2008). Our results are similar to those found by Popoguine in Senegal, which showed that 82% of respondents knew the mode of transmission of malaria. Seck I, Fall IS, Faye A, Ba O, Tal-Dia A, 2008; on Knowledge, attitudes and practices of women on malaria, in the rural area of Poponguine, Senegal. Tropical Medicine 68: 629-633.

Malaria prevention measures

The discourse of the heads of households indicates that the use of LLINs helps to provide good protection in the fight against malaria, as evidenced by this statement: "The mosquito net; the Muskito, Insecticides; I often use insecticides, mosquito nets and muskitos," Men EICMZS Kenya.This result corroborates those obtained byDavos DANVENE SANGBA28% of households have good practices relevant to all malaria control activities. And This result can be superimposed on that of Kiniffo *et al*. observed in 2000 in Benin. (KINIFFO I. (1993). Knowledge, attitudes and practices of mothers of children under five with regard to malaria in the Sub-prefecture of Sô-Ava. Public Health Memorandum, IRSP, 130 p)

Causes of Malaria

Many of the participants do not recognize the causes by confusing them with how you get malaria, which is the bites; here are their testimonies in his words: "I know it comes when mosquitoes bite us; *Stagnant water that causes mosquitoes and when they bite us we get sick. So it was the mosquitoes that caused that. »*Women EICMZS Kenya; 22 years old. Tal Dia *et al*. (2002) also obtained results contrary to our finding that in Senegal 85% of people interviewed associated the transmission of malaria with mosquito bites. Tall-Dia A, Fall IS, Camara B, Wone I, Ndiaye P, Mbaye, Diouf FN, 2002. Obstacle in the treatment of childhood malaria in the city of Mékhé (Senegal). Dakar Médical 47: 159-63. It should be noted that the level of knowledge of the populations in terms of the mode of transmission of a disease is an indicator making it possible to guide efficient strategies to fight against this disease (WHO, 2014). WHO (World Health Organization), 2014. Training module in the fight against malaria: management of malaria. Instructor's Guide. p.p. 102.

Conclusion

This study, conducted with 8 heads of households, noted that in general, the heads of households indicate that the use of the LLIN helps in the good protection against malaria and many of the participants do not recognize the causes by confusing them with how you get malaria, which is bites. Theknowledge and practices of heads of households in the Kenya health zone on the prevention of malaria is an essential public health issue, due on the one hand to the importance of the disease, particularly in Africa, and on the other hand to rapid emergence. As knowledge conditions the cause and the prevention, it is crucial to strengthen the capacities of heads of households in the national policy to fight against malaria, and also to intensify health education in all strata of the population.

Abbreviations: IBD: Mosquito Nets Impregnated with Insecticides, IPT: Intermittent Preventive Treatment, CPS: Chemo-Prevention of Seasonal Malaria, HGR: General Reference Hospital, WHO: World Health Organization, PMA: Minimum Package of Activities, PCA: Complementary Package of activities, HZ: Health Zone.

Ethical approval and consent to participate

Given that in any research, ethical and deontological rules must be respected and announced to the respondents, before collecting the data we explained to the heads of the households who were the subject of our study the purpose of our survey, emphasizing on the anonymity of person in order to guarantee the results of our study.

Competing interests

The authors declare that they have no competing interests.

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