Original Research Article

Prevalence and socio-economic determinants of malaria among children under five in Cameroon

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ABSTRACT

Background: Malaria is a major risk of morbidity and mortality among children under five in Cameroon with 13.7% of deaths in 2017. This paper aims to determine the prevalence and socioeconomic determinants of malaria among children under five in Cameroon.

Methods: The study used secondary population data from 5th demographic and health survey (DHS-V). A stratified, 2-stage sampling was implemented and yielded a sample of 4094 children under 5 years of age who underwent a rapid diagnostic test (RDT). The logistic regression model was used to estimate the prevalence and socio-economic determinants of malaria with multivariate descriptive and explanatory analysis. The results were presented in terms of cross tabulations and frequencies and the differences were considered statistically significant at a p<0.05.

Results: The results show that 1024 out of 4094 children were tested positive, with a prevalence rate of 25%. There is a regional and residential disparity in malaria prevalence and a child living in a rural area was twice more likely to be infected with malaria. The prevalence of malaria is a function of the socio-economic characteristics of the household, as prevalence decreases as well-being improves from 33.8% among the poor to 13.3% among the rich. Low socio-economic status is a risk factor for malaria infection in children under five in Cameroon.

Conclusions: The policy implications are concerned with the reduction of socio-economic disparities, the promotion of free health care and universal health coverage in Cameroon.

Keywords: Malaria, Prevalence, Socio-economic determinants, Children under five, Cameroon

INTRODUCTION

Malaria is a major public health problem in low-income tropical countries.[1,2] The malaria pathogen is a protozoan of the plasmodium type transmitted to humans by the bite of an infected female Anopheles mosquito.[3] In 2017, more than 3.07 billion people worldwide were at risk of contracting malaria.[4,5] Sub-Saharan Africa accounts for nearly 90% of malaria cases and 80% of associated deaths worldwide.[6] Children under five years represent about 61% (266,000) of malaria deaths worldwide. Cameroon is one of the fifteen countries most affected by malaria, with 3% of all malaria cases worldwide and 3% of malaria deaths in 2019; this makes it the third most affected

country in Central Africa with 12.7% of cases. In Cameroon, the malaria deaths among children under 5 years was 13.7% in 2017 and the mortality rate was 74.8 per 1,000 live births.[7]

Debates on the importance of the malaria issue have led to several studies on the factors that explain this disease.[8] Despite important scientific contributions, malaria remains a concern in African countries. Institutional, socio-cultural, socio-economic, environmental factors, individual characteristics and household health behaviours influence malaria morbidity.[9,10] Children in the same neighbourhood share a set of socioeconomic characteristics related to vulnerability that may contribute to the occurrence of malaria.[11] The hypothesis of this study is that residence and socioeconomic characteristics influence the risk of malaria in children under 5 years in Cameroon. This study contributes for a better understanding of the socio-economic determinants of malaria morbidity among children under 5 years in Cameroon. It aims to (1) determine the prevalence of malaria among children under 5 years and (2) identify the socio-economic determinants of malaria in the same population in Cameroon.

METHODS

Study type

This was a cross-sectional study using retrospectively secondary data collected through the fifth demographic and health survey (DHS-V) to analyse the prevalence and socio-economic determinants of malaria among children under 5 years in Cameroon during.

Study place and period

The study took place in the community (households) across all the regions of Cameroon. Indeed, the DHS-V was conducted from 16th June 2018 to 19th January 2019, by the national institute of statistics, in partnership with the ministry of public health.[12]

Sampling technique

A stratified, two-stage sampling was implemented. In the first stage, 470 clusters were drawn systematically with probability proportional to their household size. In the second stage, a sample of 28 households per cluster was selected with equal probability. The selected national sample consisted of 13,160 household's representative of the national urban and rural population and at the regional level (Adamaoua (4,9%), Centre excluding Yaoundé (9,9%), East (6.2%), Littoral without Douala (3,7%), Douala (12,3%), Far North (14.8%), North (12,6%), North West (6.5%), West (10.6 %), South (5,3%), South West (2.2%), Yaoundé (11.2%). In a subsample of 50% of households, all women aged 15-49 years and all children aged 6-59 months were also eligible for malaria testing.

Selection criteria

In this sample, all children aged 6-59 months were eligible for malaria testing. All children under 5 years of age whose parents voluntarily give and sign their informed consent/accent forms were included in the study. Conversely, any children under 5 years of age whose parents refused to voluntarily give and sign their informed consent/accent forms were excluded from the study. In line with the inclusion criteria, 4094 children under 5 years were tested for a malaria. The SD BIOLINE malaria antigen P.f. RDT was performed on 1851 urban and 2243 rural children.

Statistical analysis

The logistic regression model was used to identify the determinants of malaria prevalence among children under 5 years old. The result of the malaria RDT constitutes the dependent variable of this study. This dependent variable is binary or dichotomous, distinguishing children under 5 years who were tested positive for malaria from those who were tested negative.

The independent variables refer to the socio-demographic and health (morbidity) characteristics of the child and the household. The set of independent variables x include area of residence, age of child (less than 12 months, 12-35 months and 36-59 months), child's insecticide treated net use (Yes, No), sex of household head (male, female), mother's education level (no education, primary, secondary, tertiary) and economic well-being quintile (very poor, poor, middle, rich and very rich).

The dependent variable of the logistic model was defined as follows:

$$y_i = \begin{cases} 1 \text{ si l'enfant est atteint du paludisme } (y_i^* > 0) \\ 0 \text{ si l'enfant n'est pas atteint du paludisme} \end{cases}$$

The underlying linear model is written:

$y_i^* = x_i\beta + \epsilon_i$ with ϵ_i which follows a logistic distribution whose distribution function is given by and $F(x_i) = \frac{1}{1+e^{-x_i}}$ ϵ_i are independent and identically distributed.

This model explains the health status of a child by defining the probability of having malaria as the expectation of the coded variable y_i :

$E[y_i] = prob(y = 1) \times 1 + prob(y = 0) \times 0 = prob(y = 1)$

Thus, the explained variable (the probability of occurrence of this event conditional on the exogenous variables) is defined by:

$p_i = prob(y = 1|x_i) = F(x_i\beta) = \frac{1}{1+e^{-x_i\beta}}$

Considering the unobserved variable y_i^* the model is written as follows:

$$y_i = \begin{cases} 1 \text{ si } (y_i^* > 0) \\ 0 \text{ si } (y_i^* \leq 0) \end{cases}$$

The underlying model is written: $y_i^* = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_5 x_{5i} + \varepsilon_i$ with:

x_{1i}: The age of the child i;

x_{2i}: The gender of the head of the child's household i;

x_{3i}: The use of the net by the child i;

x_{4i}: The educational level of the child's mother i;

x_{5i}: The quintile of economic well-being of the child's household i;

$\beta = (\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5)^t$ is the vector of model coefficients and ε_i the error term.

Analyses were performed in excel and Stata software (version 13). Odds ratios representing the adjusted prevalence ratios were calculated. The level of significance retained for this study is 0.05 for a 95% confidence level of the prevalence ratios.

Concept of odds ratio

The ratio of the probability associated with an event to the probability of the event not occurring is called the odd (or chance), given by ($c_i = \dfrac{p_i}{1 - p_i}$) this ratio is in the $e^{-x_i \beta}$ case of a Logit model), where p_i is for individual (i) the probability of the event occurring. In the case of our study, this means that child (i) is c_i times more likely to get malaria.

The odd ratio is given by the quantity $\dfrac{p_i / 1 - p_i}{p_0 / 1 - p_0}$ where p_i and p_0 are the probabilities of an event occurring, associated respectively with the (1) and (0) modalities (0 being the reference modality) of a polytomous explanatory variable. In this study, the odd ratio (OR), for a given explanatory variable X, is interpreted as follows:

If OR >1 then malaria is common in children with trait X;
If OR =1 then malaria is independent of the X trait; and
If OR <1 then malaria is common in children who do not have trait X.

The data of this study was initially analysed on the basis of descriptive statistics and the Chi² dependence's test. This technique provided an initial view of the level of association between malaria positivity and other socio-demographic factors as well as the quintile of economic well-being. The data analysis used two techniques: descriptive analysis (bivariate and multivariate) and multivariate explanatory analysis. Different associations were made and the results were considered statistically significant at a p<0.05.

Ethical approval

Ethical approval was obtained from the ethical review committee for the protection of human subjects and adult participants (children's parents provided written consent for themselves and their children prior to enrolment).
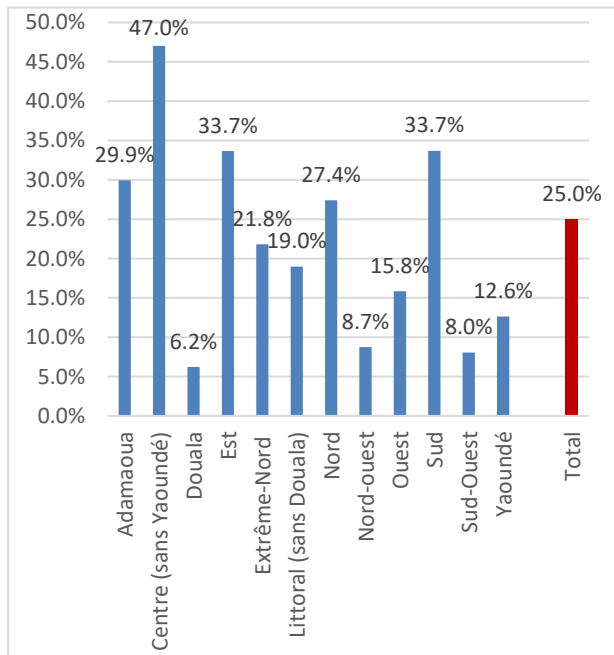
RESULTS

Overall, 4094 children under 5 years of age were tested for parasitaemia using an SD BIOLINE malaria Ag P.f/Pan RDT kit. These 4094 children represent approximately 98% of all children under 5 years of age identified during the EDSC-V survey. The distribution of children who received the RDT shows that there were slightly more children in urban areas (55%) than in rural areas (45%). Moreover, 492 (12%) children were under 1 year of age, 1846 (45%) were between 12 and 35 months of age (equivalent to 1 to 3 years) and 1756 (43%) were between 36 and 59 months of age (equivalent to 3 to 5 years). 83% of these children were from male-headed households and 17% from female-headed households. According to the educational level of the child's mother, 23% of the children had a mother with no education, 35% had a mother with primary education, 37% had a mother with secondary education and only 5% had a mother with higher education. About 80% of these children spent their last night under the net. Considering the quintile of economic well-being, 19% of the children were from extremely poor households, 23% from poor households, 23% from middle-income households, 21% from rich households and 14% from very rich households (Table 1). A total of 1024 out of 4094 children who received a malaria RDT were tested positive. This represents a positivity rate of 25%. The Centre region (excluding the city of Yaoundé) is the one in which children under 5 years of age were most affected by malaria (47%). It is followed by the East and South regions with a positive rate of 33.7% each. They were followed by Adamaoua (29.9%), North (27.4%), Far North (21.8%), Littoral without Douala (19%), West (15%), Yaoundé (12.6%), North West (8.7%), South West (8%) and finally Douala (6.2%).

Table 2 highlights the regional disparity in malaria prevalence among children under 5 in Cameroon. More specifically, the level of association between malaria prevalence in children under 5 and the quintile of household welfare of these children was calculated for each region. The results show that for a threshold of 5%, for 09 regions out of 10 plus the cities of Yaounde and Douala, there is a significant correlation between the

prevalence of malaria in children and the level of household welfare. The exceptions are Douala (0.76), Yaoundé (0.10) and the South West (0.19). This lack of association may be due to the fact that in these cities and the South West region, children under 5 years of age were not identified in poor and very poor households. The regions most affected by malaria are the Centre, East, South and North. These regions have for all levels of household economic well-being a higher prevalence of malaria in children under 5 than the national level. Very poor households are more affected in the Centre region and the poor in the North region (Table 2).

The results of this study also show that the rural area was twice as affected by malaria at the time of data collection (Table 3). Indeed, out of 2245 children under 5 years of age tested in rural areas, 749 were tested positive, indicating a rate of 33.4%, whereas in urban areas this rate was 14.9%. Overall and regardless of the area of residence, children over 3 years of age were the most affected by this malaria endemic disease (Figure 1).

Figure 1: Distribution of malaria prevalence among children under 5 years of age by region of residence.

In urban areas, out of 1851 children tested for malaria, 1472 slept during the previous night in the mosquitoes' net and of these 14.6% were tested positive for malaria. In contrast, of those who slept during the previous night under the net, 15.8% had malaria. These proportions are much higher in rural areas. In rural areas, the malaria positivity rate for children who slept during their last night under a net was 32.7%, while for those who did not sleep during their last night under a net it was 36.2% (Table 3).

Looking at the prevalence of malaria among children through the prism of their mother's level of education, it

appears that overall, the lower the mother's level of education, the higher the prevalence. The prevalence of malaria among children under 5 years whose mothers have a higher level of education is 8% in urban areas and 19% in rural areas.

Regarding the economic well-being quintile, the prevalence is higher when the household is very poor and lower when the household is rich or very rich.

The Chi^2 dependency tests between the dependent and independent variables revealed the following: regardless of the area of residence, there is a significant relationship between malaria prevalence and child age (p<0.00; p<0.00); in urban areas, there is a significant association between the gender of the head of household and the prevalence of malaria in children (p<0.02); also in urban areas, there is a significant relationship between the mother's level of education and the prevalence of malaria in children (p<0.01); and in both rural and urban areas, there is a significant association between household economic well-being quintile and malaria prevalence in children (p<0.00; p<0.00).

The logistic model allowed further analysis to highlight the factors that determine the prevalence of malaria among children under 5 years of age (Table 4). It was found that in urban and rural areas, compared to children under 1 year, children aged 12-35 months were almost twice (OR=1.89; OR=1.77) more likely to have malaria, while those aged 35-59 months were 2.5 times more likely (OR=2.48; OR=2.48). In urban areas, compared to male-headed households, malaria is more common among children living in female-headed households (OR=1.32). This result is quite the opposite in rural areas where these same children have less likely to be infected with malaria (OR=0.74).

The same model shows that in urban areas there is no relationship between children sleeping under a net and malaria prevalence (OR=1), whereas in rural areas children who sleep under a net are less exposed to malaria than those who do not sleep under a net (OR=0.86). In urban areas, children of uneducated mothers have a lower risk of being infected with malaria than other children. In contrast, in rural areas, children of mothers with a higher level of education are the most protected from the malaria.

In economic terms, it appears that compared to children living in very rich households, children from very poor households are 5 times more exposed to malaria in urban areas and 3.5 times more exposed in rural areas. Children living in poor households are 2 times more exposed to malaria in urban areas and 4 times more exposed in rural areas. Those living in middle-income households are 3 times more exposed in both urban and rural areas (OR=2.98; OR=2.88). Children from wealthy households are on average 1.5 times more exposed regardless of their place of residence.

Table 1: Socio-economic and demographic characteristics of children under 5 years of age tested for malaria.

Category	Number of children, (n=4094)	Percentage (%)
Place of residence		
Urban	1851	45.2
Rural	2243	54.8
Age of the child (months)		
<12	492	12.0
12-35	1846	45.0
35-59	1756	42.9
Use of the net		
Yes	3268	79.8
No	826	20.2
Gender of the head of household		
Woman	709	17.3
Male	3385	82.7
Mother's education level		
No	939	22.9
Primary	1417	34.6
Secondary	1530	37.4
Superior	208	5.0
Household economic well-being quintile		
Very poor	793	19.3
Poor	957	23.4
Medium	924	22.6
Rich	846	20.7
Very rich	574	14.0

Table 2: Regional disparity in malaria prevalence among children under 5 years of age in Cameroon.

Regions	Economic well-being quintile (%)					P value
	Very poor	Poor	Average income	Rich	Very rich	
Adamaoua	39.8	47.0	18.6	9.4	5.0	0.00
Centre	68.8	49.7	51.7	39.8	23.5	0.01
Douala	/	/	0.0	6.3	6.4	0.76
East	46.0	33.1	40.2	10.9	12.0	0.00
Far North	25.9	25.5	10.7	2.1	0.0	0.00
Coastal	33.3	37.2	18.5	10.6	12.1	0.01
North	34.5	52.4	23.1	12.2	10.0	0.00
North-West	28.1	10.9	3.7	0.0	0.0	0.00
West	/	28.2	16.2	8.9	2.0	0.00
South	45.5	50.6	39.8	18.4	18.0	0.00
Southwest	/	/	0.0	4.8	14.3	0.12
Yaoundé	/	/	20	14.8	8.3	0.10
National	33.8	34.7	27.4	13.9	9.2	0.00

Table 3: Socio-economic characteristics of children under 5 years of age tested for malaria.

Variables	Urban			Rural			Set	
	N (1851)	Palu (14.9) (%)	Chi square	N (2243)	Palu (33.4) (%)	Chi square	N (4094)	Palu (1024) (%)
Age (months)								
<12	219	8.2		273	20.9		492	15.2
12-35	828	14.0	0.00	1018	31.5	0.00	1846	23.7
35-59	804	17.5		952	39.0		1756	29.2
Use of the net								
Yes	1472	14.6	0.55	1796	32.7	0.15	3268	24.5
No	379	15.8		447	36.2		826	26.9

Continued.

Variables	Urban			Rural			Set	
	N (1851)	Palu (14.9) (%)	Chi square	N (2243)	Palu (33.4) (%)	Chi square	N (4094)	Palu (1024) (%)
Gender of the head of household								
Male	1459	20.2	0.02	1926	39.0	0.08	3385	25.4
Woman	392	18.1		317	40.1		709	23.0
Mother's education level								
No	212	15.1	0.00	727	34.5	0.36	939	30.1
Primary	528	18.6		889	32.2		1417	27.1
Secondary	924	14.1		606	34.3		1530	22.1
Superior	187	8.0		21	19.0		208	9.1
Economic welfare quintile								
Very poor	53	34.0	0.00	740	33.8	0.00	793	33.8
Poor	127	15.7		830	37.6		957	34.7
Medium	427	23.2		497	31.0		924	27.4
Rich	715	12.7		131	20.6		846	13.9
Very rich	529	8.9		45	13.3		574	9.2

DISCUSSION

The results of the descriptive statistics, indicate that the prevalence of malaria in children under five years of age is 25% at the national level (Table 1). However, there are regional disparities in the prevalence of malaria among children under five in Cameroon (Figure 1). The region of residence has an influence on the malaria morbidity status of children under 5 years of age in Cameroon. Compared to children living in other regions, children living in the forest regions have a slightly higher risk of malaria. On the other hand, the mountainous regions of the Western Cameroon are associated with lower malaria risks. Indeed, the forest regions of the country bear the greatest burden of malaria among children under 5 years of age where the Central region records the highest prevalence rate of 47.0% of cases, followed by the Eastern and Southern regions with 33.7% of cases respectively. These results could be explained by the favourable socio-ecological conditions, notably the forest and the rainfall, for the development of *Anopheles* responsible for the transmission of malaria in the most malarious regions. The northern and Littoral regions also have a high prevalence of malaria in children under 5 years of age with the Adamaoua region recording about 30% of cases, the North region 27.4% of cases, the Littoral region 19.0% of cases and the Far North region 21.7% of cases of malaria in children under 5 years. However, compared to the other regions, the prevalence of malaria among children under 5 years of age in the mountainous areas of western Cameroon appears to be relatively low, with prevalence rates of 15.8% for the West region, 8.7% for the North West region and 8.0% for the South West region. These results can be explained by the high population densities in these regions. High population density may be a protective factor as it helps to dilute the individual risk of mosquito bites.[13] Our results on regional malaria disparity corroborate the results of previous studies on malaria morbidity in children under 5 years of age.[14] Province of residence strongly influences the occurrence of malaria in children aged 6-59 months in Democratic Republic of Congo where children from the central and south-eastern provinces are respectively 2.54 and 2.93 times more likely to contract malaria than their counterparts residing in the western provinces.[15]

The results also indicate a disparity in malaria parasite prevalence between rural and urban areas. In rural areas, the prevalence of malaria among children under five years of age is more than twice that recorded in urban areas (14.9% versus 33.4%). These differences according to place of residence show that within the age groups, the proportion of children under five years of age who have been tested for malaria is higher in rural areas than in urban areas (54.8% compared to 45.2%), with increasing prevalence as the age of the child increases. In rural areas, referring to children under one year of age, children aged 12 to 35 months are 1.7 times more likely to be infected with the disease and those aged 35 to 59 months 2.5 times more likely to be infected. It is therefore clear that the adjusted prevalence ratio increases with the age of the child. This may be explained by the fact that in rural areas, children over one year of age are more likely to be infected with malaria because of the sanitary conditions and the proliferation of the vector agents. These results corroborate previous studies where the risk of being infected with malaria increases with the age of the child in Central Africa. Children aged 24-59 months are 2.14 times more likely to be infected with malaria than younger children aged 6-23 months in the Democratic Republic of Congo.[15]

Considering the mosquito net use, children sleeping under a net in rural areas are more protected from malaria than those who do not, probably because in rural areas the prevalence of the disease is higher and net use appears to be the best means of protection. These results are in line with research in the Democratic Republic of Congo where net use significantly reduces the risk of contracting malaria: children who do not sleep under a net are 1.24 times more likely to be infected with malaria.[15]

The risk of being infected with malaria decreases significantly with an increase in the standard of living. The incidence of malaria in children under the age of 05 is also a function of the level of economic well-being. Although the distribution does not show great disparities according to the area of residence, it presents the relationship between the level of well-being and the malaria prevalence ratio. Thus, in rural areas, it is observed that prevalence decreases as well-being improves. It decreases from 33.8% in the poorest households to 13.3% in the richest households. This result was expected and corroborated those in the literature that have found similar results showing that the risk of being infected with malaria decreases as the standard of living of households improves.[16-19] Children in middle and high standard of living households are 13.8% and 45% less likely to be infected with malaria respectively, and crowding significantly influences the occurrence of malaria in children. Children in households where one room is shared by more than three people are 1.18 times more likely to be infected with malaria than their counterparts in households where one room is shared by 1-3 people. This may be explained by the fact that the richer the household, the more likely it is to have access to preventive measures and care related to the management of malaria. The healthy living environment that a wealthy household can afford means less exposure to malaria vectors.

The results also show that the mother's level of education has a direct link with the prevalence of malaria in children under 5 years old. Indeed, in urban areas, compared to children whose mothers have no education, children whose mothers are educated have a higher probability of being infected with malaria. These results contradict the literature which indicates that the risk of being infected with malaria in children decreases with the level of education of the mother. Compared to children of mothers with no education, children of mothers with secondary education or higher have a 39.2% lower risk of being infected with malaria compared to children of mothers with primary education or no education.[19, 20] This is an important result because, contrary to the literature which suggests that a high level of maternal education improves the quality of child care, our results show a negative effect of maternal education on the health of Cameroonian children in urban areas. This situation could be explained by the fact that educated women nowadays have the same professional status as men. Today, women hold important positions in the world of employment. They sometimes find themselves obliged to spend more time at work than looking after their children. Moreover, feminism which advocates gender equality can lead women to shirk the obligation to protect their children by attributing it to the father. According to this principle, the father is responsible for his child in the same way as the mother. This situation is quite the opposite in rural areas where the children of mothers with a higher level of education who are less likely to be affected by malaria. This also makes sense because in rural areas, educated women, aware of the precarious environment in which they live and the challenges of malaria control, naturally take precautions to protect their children from malaria infection. However, a high level of education gives women a public and a private status and allows them to participate in the couple's decision making in matters of health and hygiene for their children. High educational attainment reduces the weight of tradition and practices that are unfavourable to children's health.[21] The level of education of the head of the household and especially of the mother has an influence on the health seeking behaviour of the household. Educated heads of households and mothers are supportive and correctly assimilate preventive advice on malaria. The education of the head of the household and the child's mother influences the household's knowledge, attitudes and practices regarding malaria morbidity.[22] In addition, women with higher education or more are more likely to be employed than their male counterparts. It is likely that these women have access to higher incomes that could also enable them to afford malaria preventive measures. Children of educated mothers live in households with a high standard of living and have a variety of opportunities to protect themselves from mosquito bites. In addition to the availability of insecticides and mosquito coils, these children of educated mothers live in urban environments that repel mosquito breeding grounds.[23]

Referring to the gender of the head of household, the results show that it has a significant influence on the prevalence of malaria in children under five. Indeed, in urban areas, children from female-headed households are slightly more exposed to the disease than those living in male-headed households. And in rural areas, the latter are less exposed to malaria. This result is surprising in urban areas when one considers the involvement of women in family management and family welfare. Nevertheless, an explanation could be found in the fact that female-headed families in urban areas are mostly single-parent families. Therefore, all the responsibilities and burdens of the household fall on this one woman. This is a difficult burden for even the most courageous woman to bear and to assume.

However, this work has limitations related to the data and the methodology used that should be noted. The literature informs us that malaria morbidity in children cannot be explained by socio-economic determinants alone, especially in the context of African countries. There are other determinants such as institutional, socio-cultural, environmental, and child factors, and household health seeking behaviours that can influence the occurrence of malaria in children under 5.

CONCLUSION

Malaria remains a public health problem in Cameroon. Children under 5 years of age are among the most vulnerable groups. The objective of this study was to highlight the adjusted prevalence ratios of malaria among

children under five and to understand the socio-economic factors that explain this. In Cameroon, malaria prevalence was predominant among children living in poor households. The paper highlighted the importance of determinants such as area of residence, level of economic well-being of the household, gender of the head of the household and level of education of the mother on the occurrence of malaria among children under five in Cameroon. The rural area where poverty is high also has the highest prevalence of malaria in children under five. In this regard, malaria control policies must take into account the role of the economic well-being quintile and geographical disparities in access to health care and services. More targeted intervention and greater access to health services can help to reduce the prevalence of malaria among children under five in Cameroon. It may also be appropriate to popularise malaria prevention measures throughout the country. By combining policies that take into account the improvement of the standard of living of households and access to health services, it would be possible to reduce the prevalence of malaria among children under five and infant and child mortality in Cameroon. In this perspective, it is important to continue and reinforce free treatment of malaria for children under five. The policy implication is the reduction of socio-economic disparities, the promotion of free health care and universal health coverage in Cameroon.

ACKNOWLEDGEMENTS

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