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Economic and Social Determinants of Women's Demand for Insecticide-Treated Mosquito Nets in Cameroon

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Abstract

Background: Malaria is a fatal, but preventable and curable parasitic disease that is widespread in Africa. Insecticide-treated mosquito nets (ITNs) are one of the most effective preventive methods. The aim of this study was to analyze the economic and social determinants of women's demand for ITN in Cameroon.

Methods: We used a cross-sectional study design of a nationwide stratified, two-stage sampling including 9,733 women. A logistic regression model was used for both bivariate and multivariate analysis with a statistically significant level of p<0,05.

Results: Women's demand for ITNs was relatively low at 28.8% of the sample. Some 17.37% of employed women expressed demand for ITNs, compared with 6.71% of unemployed women (p<0.00). Demand for ITNs was significant between the different quintiles of economic well-being, with respectively 1.66% and 4.89% among the poorest and poorest, and 6.40%, 5.51% and 5.62% among the middle class, richer and richest (p<0.00). Social determinants such as age between 35-49 years, primary, secondary or tertiary education, an educated husband, single, prenatal consultations in a formal health center, Christian religion, access to media, residence in an urban area, living in the Adamaoua, Far-North, Littoral, South, and South West regions significantly influence women's demand for ITN in Cameroon.

Conclusion: Health policy-makers should direct strategies to strengthen the economic and social determinants identified in this study, in order to boost demand for and use of ITNs by women in the country.

Introduction

Malaria is a fatal but preventable and curable parasitic disease that is widespread throughout the world, with a major impact on global public health and the economic development of affected countries [1, 2]. Globally, there were an estimated 247 million cases and 619,000 deaths from malaria in 2021, and the number of malaria cases continue to rise between 2020 and 2021, showing a trend that could complicate the achievement of malaria control targets in 2030 [1]. It is widespread in tropical and subtropical regions, particularly in Africa and South-East Asia [2, 3]. The African region disproportionately bears the greatest global burden of malaria, with respectively 234 million cases (95%) and 593,000 deaths (96%) due to the disease worldwide in 2021 [1, 4]. Africa remains the region most affected by this deadly disease, partly because too many people lack access to preventive measures and treatment [1]. Malaria continues to take a heavy toll on the health, economic and social development and livelihoods of populations since malaria transmission is endemic in most low- and middle-income settings particularly in many African countries [2, 4-6]. Yet the use of impregnated mosquito nets has been shown to be more likely to break the malaria transmission cycle in endemic countries [7]. Indeed, insecticide-treated nets (ITNs), and more particularly long-lasting insecticide-treated nets (LLINs), are known to be highly effective in reducing malaria morbidity and mortality [8-10]. The World Health Organization (WHO) recommends achieving high coverage rates of long-lasting insecticide-treated nets in endemic areas through free or heavily subsidized distribution of LLINs, in order to maximize the effectiveness of malaria control programs [7, 9, 11]. However, achieving universal coverage and use of LLINs remains a challenge on the African continent, due to the socio-economic context that influences household behavior and vulnerable groups such as pregnant women and children under five [12-14].

In Cameroon, malaria is the most widespread endemic disease, responsible for few millions reported cases and absenteeism from school and work annually [15]. Cameroon population at risk of malaria is estimated at 27,795,843 inhabitants in 2022 with an incidence rate of 113.4 per 1,000 population and a prevalence rate of 24% among children under five years [16-18]. Thus, Cameroon is among 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 [19]. Cameroon's health services reported 3,327,381 cases of malaria representing about 29.6% of all consultations nationwide in 2022 [20, 21]. The goal of Cameroon's current National Strategic Plan (NSP) for malaria control 2019-2023 is to contribute to improving the people welfare by reducing the health, economic and social burden of malaria nationwide through effective prevention and case management [15, 22]. Prevention includes ITN distribution via mass campaigns and routine channels, promotion of ITN use, IPTp, seasonal malaria chemoprevention (SMC) for children 3 to 59 months of age. The routine ITN distribution strategy expands beyond distribution to pregnant women through ANC to include the Expanded Program for Immunization platform for children under five years [22].

Some studies have shown that LLINs are currently a fundamental tool for protection against mosquito bites and malaria transmission, particularly among women and children under five, the group most at risk of the disease [23-26]. Other studies have focused on the socio-demographic determinants of ITN use [19], showing that economic and socio-behavioural factors, such as perceived susceptibility to malaria, knowledge of ITNs and attitude towards ITNs, which may favour non-use of ITNs, need to be further investigated [27, 28]. Indeed, both coverage and appropriate ITN utilization is important for malaria prevention since either some of the ITNs that are owned by a household can be left unused or even those that are utilized were not given priority for the needy members of the households such as women and children and utilization cannot be consistent [29, 30]. Numerous other studies have concluded that the economic and social status of the individual is associated with levels of malaria preventive practice in the community [31-34]. Although some researches on ITN utilization have been carried out in many settings, almost all of them have focused on utilization alone rather than factors associated with the demand for ITN utilization [35-38].

In Cameroon, to best of our knowledge there was no previous study on economic and social determinants of ITNs utilization among pregnant women in study area. Therefore, the findings of study will be helpful for policy makers and the partners to recommend and redesign appropriate vector control interventions or used to improve women's demand for ITNs utilization in the country. Thus, this study aimed to assess the economic and social determinants of women's demand for insecticide-treated mosquito nets in Cameroon.

Methods

This study used population-level secondary data based on the fifth Cameroon Demographic and Health Survey (DHS-V) [18] to analyze the economic and social determinants of women's demand for ITN in Cameroon. DHS-V data were obtained from ICF International Macro Demographic and Health Surveys through online registration and a formal request for access to the dataset. Additional authorization was requested from the Ministry of Public Health and the National Institute of Statistics of Cameroon. The study covered a total sample of 9,733 women from households nationwide. The data analysis adopted a logistic regression model where the dependent variable is a binary indicator "demand for ITNs" which indicates whether women of childbearing age have demanded ITNs for use in malaria prevention. The independent variables are a set of economic and social indicators with 2 or more modalities. The model therefore constructs a binary logistic model

to estimate the probability of a binary response as a function of a set of predictor variables. The set of independent variables includes the woman's characteristics. Our dependent variable "demand for ITNs" is defined as follows:

$$y_i = \begin{cases} 1 & \text{if the woman demands an ITN} \\ 0 & \text{if not} \end{cases}$$

Let y_i^* the unobserved variable defined by $y_i^* = x_i\beta + \varepsilon_i$ where ε_i is a random variable with mean zero and standard deviation σ_ε, with $\frac{\varepsilon_i}{\sigma_\varepsilon}$ which follows a logistic distribution function $\phi(x) = \frac{\exp(x)}{1 + \exp(x)}$.

The multivariate logistic regression model inspired by the work of other authors [6, 19] was used to assess the determinants of women's demand for ITNs according to a set of economic, social and demographic indicators that may influence demand for ITNs for use in malaria control.

Given the latent variable y_i^* as follows:

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

The model to be estimated can be written as follows:

$$y_i^* = \beta_0 + \beta x_i + \varepsilon_i y_i^* = \beta_0 + \beta x_i + \varepsilon_i$$

With the following detailed specifications:

$$y_i^* = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i} + \beta_6 x_{6i} + \beta_7 x_{7i} + \beta_8 x_{8i} + \beta_9 x_{9i} + \beta_{10} x_{10i} + \beta_{11} x_{11i} + \beta_{12} x_{12i} + \beta_{13} x_{13i} + \beta_{14} x_{14i} + \beta_{15} x_{15i} + \beta_{16} x_{16i} + \varepsilon_i$$

Where:

β is a vector of coefficients for the model to be estimated,

β_0, β_0, is the constant term and ε_i is the error term.

Therefore,

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11}, \beta_{12}, \beta_{13}, \beta_{14}, \beta_{15}, \beta_{16}$ are coefficients of the model to be estimated and $\varepsilon_i \varepsilon_i$ is the error term.

x_i is a set of economic and social factors that can influence the demand for ITNs:

x_{1i}: Woman age at child's birth(years) i;

x_{2i}: Education level of the woman i;

x_{3i}: Education level of the husband i;

x_{4i}: Marital status of the woman i;

x_{5i}: Employment status of the woman i;

x_{6i}: Religion of the woman i;

x_{7i}: Economic welfare status of the woman i;

x_{8i}: Accessibility to media by the woman i;

x_{9i} : Domestic's violence on the woman i;

x_{10i} : Antenatal care attendance by the woman i;

x_{11i} : Region of residence the woman i;

x_{12i} : Residence area of the woman i

Data analysis was performed in Excel and Stata software (version 14). Odds ratios were calculated. The data of this study were initially analysed on the basis of descriptive statistics and the Chi2 dependence test. This technique provided an initial view of the level of association between woman's demand for ITNs and the economic and social determinants. 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 95% confidence level with p<0.05.

Results

Socioeconomic and demographic characteristics of women

The study involved a total sample of 9,733 women throughout the country. Table 1 presents the socio-economic and demographic characteristics of the women, with a bivariate analysis of their demand for ITNs in Cameroon. It shows that the majority (75.92%) of women had not expressed a demand for ITNs, compared with only 28.8% of women who had demanded ITNs. The majority (49.02%) of women were in the 25-34 age bracket, followed by the 15-24 age bracket (31.84%) and finally the 35-49 age bracket (19.14%), whose ITN demand levels were 11.93%, 8.21% and 3.95% respectively, with a statistically significant difference between the different age groups (p<0.00). The majority of women had secondary education (38.50%), followed by women with primary education (33.29%), women with no education (23.08%) and finally women with higher education (5.14%), whose ITN demand levels were 12.49%, 8.23%, 1.26% and 2.10% respectively, with a statistically significant difference between the different education levels (p<0.00). The majority of spouses of the women in our sample had secondary education (35.40%), followed by spouses with primary education (32.99%), spouses with no education (20.75%) and finally spouses with higher education (7.71%). Here, ITN demand levels are 10.37%, 7.94%, 0.95% and 2.89% respectively, with statistically significant difference between the different education levels (p<0.00). The results show that 80.97% of the women were married, of whom only 5.54% expressed demand for ITNs, compared with 18.55% of single women (p<0.00). The majority of women (55.64%) lived in rural areas, with 10.20% of women demanding ITNs versus 13.88% of women in urban areas (p<0.00). We also note that 67.51% of women were employed, 17.37% of whom demanded ITNs, compared with 6.71% of unemployed women (p<0.00).

Independent Variables	Observations(N)	Frequency (%)	Demand for ITNs (%)		P value
Women's characteristics Woman age at child's birth(years)			No	Yes	
15 – 24	3079	31,84	23,63	8,21	**0.000**
25 – 34	4771	49,02	37,09	11,93	
35 – 49	1863	19,14	15,20	3,95	
Women's level of education					
No education	2246	23,08	21,81	1,26	**0.000**
Primary	3240	33,29	25,06	8,23	
Secondary	3747	38,50	26,00	12,49	
Higher	500	5,14	3,04	2,10	
Husband's level of education					
No education	1635	20,75	19,79	0,95	**0.000**
Primary	2600	32,99	25,05	7,94	
Secondary	2790	35,40	25,03	10,37	
Higher	608	7,71	4,82	2,89	
Woman's marital status					

Married	7881	80,97	62,43	5,54	**0.000**
Not Married	1852	19,03	13,49	18,55	
Woman's employment					
No	3162	32,49	25,78	6,71	**0.000**
Yes	6571	67,51	50,14	17,37	
Woman's religion					
Christians	6851	70,39	49,91	20,48	**0.000**
Muslim	2539	26,09	22,89	3,20	
Animist/none/other	343	3,52	3,11	0,41	
Women's economic well-being and wealth					
Poorest	1808	18,58	16,91	1,66	**0.000**
Poorer	2286	23,49	18,60	4,89	
Middle	2331	23,95	17,55	6,40	
Richer	1895	19,47	13,96	5,51	
Richest	1413	14,52	8,90	5,62	
Woman's acces to media					
No	8181	8405	66,15	17,91	**0.000**
Yes	1552	1595	9,77	6,17	
Domestic violence on Woman					
No	7438	76,42	58,33	18,09	**0.011**
Yes	2236	22,97	17,06	5,92	
Place of antenatal consultation					
Traditional birth assistance	1041	10,70	8,84	1,86	**0.000**
Health center assistance	8692	89,30	67,08	22,22	
Woman's Region of residence					
Centre	1841	18,92	12,89	6,02	**0.000**
Adamaoua	734	7,54	6,96	0,59	
Littoral	1119	11,50	7,94	3,55	
East	1003	10,31	5,42	4,88	
Far-north	1299	13,35	12,13	1,21	
North	1217	12,50	11,27	1,23	
North-west	473	4,86	3,40	1,46	
West	952	9,78	6,88	2,90	
South	928	9,53	7,75	1,79	
South-west	167	1,72	1,26	0,45	

Woman's area of residence					
Urbain	4318	44,36	30,48	13,88	**0.000**
Rural	5415	55,64	45,43	10,20	
Total	**9733**	**100**	**75,92**	**28,8**	
Authors' calculations based on DHS-V data, *** p<0.01, ** p<0.05, * p<0.1.					

Table 1: Women's Socio-Economic Characteristics and Bivariate Analysis

The majority of women practiced the Christian religion (70.39%), followed by Muslim women (26.09%), and animists, "no religion" and women of other religions made up 3.52% of our sample; ITN demand levels were 20.48%, 3.20% and 0.41% respectively (p<0.00). The poorest and poor women constituted 18.48% and 23.49% respectively, while 23.95% belonged to the medium wealth status and 19.47% and 14.52% belonged to the richer and richest status respectively. ITN demand levels of 1.66% and 4.89% among the poorest and poor women, respectively, and 6.40%, 5.51% and 5.62% among the middle-class, riche and richest, respectively, were also noted in these classes, with a statistically significant difference between the different quintiles of economic well-being or wealth (p<0.00). Some 84.05% of the women in the sample had no access to the media and recorded an ITN demand level of 17.91%, compared with 6.17% among women who did have access to the media and expressed a demand for ITNs (p<0.00). Approximately 76.42% of women in the sample were not exposed to domestic violence against women and recorded an ITN demand level of 18.09% versus 22.97% of women who were exposed to domestic violence with an ITN demand level of 5.92% (p<0.01). Some 89.30% of women had had an antenatal consultation at a health center, compared with 10.70% at a traditional birth attendant, with ITN demand levels of 22.22% and 1.86% respectively (p<0.00). A majority of women (18.92%) were from the Central region, followed by women from the Far North region (13.35%), the North (12.50%) and at the bottom of the table the North-West regions (4.86%). Demand for ITNs varied between 0.55% and 6.02%, across the country's ten regions, with a statistically significant difference (p<0.00).

Logistic Regression Results for the ITN Demand Function

The results of the logistic regression of the ITN demand function are presented in Table 2. These results show that a woman's age is an important determinant of ITN demand. Indeed, compared to women in the 15-24 age group, women in the 25-34 and 35-49 age groups were respectively 0.9 and 0.8 times less likely (OR=0.96 and 0.83 respectively; P<0.05) to demand ITN than women in the 15-24 age group, with a statistically significant difference in ITN demand between the different age groups (p<0.05). Women with primary, secondary and tertiary education were 2; 2.6; 3.1 times more likely to demand ITNs (p<0.01) than women with no education. Women having husbands with primary, secondary and tertiary levels of education were 2.2; 1.9; 1.8 times more likely to demand ITNs (p<0.01) than wives of husbands with no education. The results also show that women who were exposed to domestic violence if the woman neglected the use ITNs were 1.2 times more likely (p<0.05) to demand ITNs than women who were not exposed. Single women were about 1.4 times more likely (P>0.1) to demand ITNs than married women. Muslim, animist, no religion and other religion women were respectively 0.7 and 0.5 times less likely (p<0.05) to request ITNs than Christian women of all faiths. Women living in rural areas were 1.7 times more likely (p<0.05) to request ITNs than women living in urban areas.

Independent Variables	Demand of ITN (1= if a woman demand an ITN ; 0= if not)			
	OR	95% CI	P value	Sign.
Mother's characteristics **Woman age at child's birth(years)**				
15 – 24 years	Reference			
25 – 34 years	0,960	[0,837 - 1,101]	0,567	
35 – 49 years	0,831	[0,696 - 0,991]	0,040	**
Woman's level of education				
No education	Reference			
Primary	2,029	[1,579 - 2 ,606]	0,000	***
Secondary	2,550	[1,944 - 3,345]	0,000	***
Higher	3,076	[2,110 - 4,485]	0,000	***
Husban level of education				
No education	Reference			
Primary	2,208	[1,661 - 2,935]	0,000	***
Secondary	1,931	[1,438 - 2,591]	0,000	***
Higher	1,811	[1,268 - 2,585]	0,001	***
Woman's marital status	2,089	[1,385 - 3,151]	0,000	***
Married	Reference			
Not Married	1,044	[0,921 - 1,184]	0,492	
Woman's employment				
No	Reference			
Yes	1,237	[1,082 - 1,414]	0,002	***
Women's religion				
Christians	Reference			
Muslim	0,685	[0,575 - 0,815]	0,000	***
Animist/none/other	0,497	[0,321 - 0,771]	0,002	***
Women's economic well-being and wealth				
Poorest	Reference			
Poorer	1,710	[1,347 - 2,171]	0,000	***
Middle class	2,142	[1,664 - 2,775]	0,000	***
Richer	1,891	[1,416 - 2,526]	0,000	***
Richest	2,609	[1,896 - 3,591]	0,000	***
Woman's acces to media				
No	Reference			

Yes	1,422	[1,222 - 1,655]	0,000	***
Domestic violence on woman				
No	Reference			
Yes	1,298	[1,132 - 1,488]	0,000	***
Don't know	0,184	[0,043 - 0,779]	0,022	**
Place of antenatal consultation				
Traditional birth assistance	Reference			
Health center assistance	1,403	[1,119 - 1,761]	0,003	***
Woman's region of residence				
Centre	Reference			
Adamawa	0,500	[0,355 - 0,705]	0,000	***
East	0,873	[0,717 - 1,063]	0,179	
Far-north	2,828	[2,300 - 3,476]	0,000	***
Littoral	0,724	[0,550 - 0,951]	0,021	**
North	0,825	[0,634 - 1,074]	0,154	
North-west	1,137	[0,873 - 1,481]	0,338	
West	1,220	[0,994 - 1,496]	0,056	*
South	0,580	[0,458 - 0,735]	0,002	***
South-west	0,500	[0,322 - 0,779]	0,000	***
Woman's area of residence				
Urbain	Reference			
Rural	0,75	[0,638 - 0,876]	0,000	***
Constant	0,03	[0,020 - 0,051]	0,000	***
Number of observations		7881		
LR chi2 (Prob>chi2)		1234,84(0.000)		
Pseudo R²		14,56%		
Authors' calculations based on DHS-V data, *** p<0.01, ** p<0.05, * p<0.1				

Table 2: Logit Estimation of the Demand Function for ITN by Women

Working women were 1.2 times more likely (P<0.01) to demand ITNs than unemployed women. Women in the poor, middle, rich and very rich income quintiles were respectively 1.7; 2.1; 1.9; 2.6 times more likely (p<0.01) to demand ITNs than women in the very poor income quintiles. Women who had access to media were 1.4 times more likely (p<0.01) to demand ITNs than women who did not. Women who made their prenatal visits at a formal health center were 1.4 times more likely (p<0.01) to demand ITNs than women who made their visits at a traditional birth attendant. Women in the Adamaoua, East, Littoral, North, South and Southwest regions were respectively 0.5; 0.7; 0.8; 0.6; 0.5 times significantly less likely to demand ITNs than women in the Central region, while women in the Far North, West and Northwest regions were 2.9; 1.2; 1.3 times more likely to demand ITNs than women in the Central region.

Discussion

The results show that economic and social determinants influence women's demand for ITNs to prevent malaria in Cameroonian households. Overall, the results show that 28.8% of women in the sample expressed demand for ITNs, compared with 75.92% of women who did not demand ITNs for use in malaria prevention. In relation to the total number of women constituting potential demand, these results indicate the low level of demand for ITNs among women of childbearing age and breastfeeding women in Cameroon. This may be explained by the fact that, despite awareness campaigns and the free distribution of ITNs, certain economic and socio-cultural conditions specific to the country's context are not conducive to further stimulating demand for ITNs among Cameroonian women. This high level of non-demand and relative low demand of ITNs by women is similar to that found in previous studies in developing countries [28, 39]. However, these results contradict those of studies in northern Nigeria, Ethiopia and Ghana, which found that the majority of breastfeeding women expressed demand for ITNs for use against malaria [6, 9, 11]. In terms of age, women in the 25-34 and 35-49 age groups were less likely (OR=0.96 and 0.83 respectively) to demand ITN than women in the 15-24 age group. The difference was statistically insignificant for the 25-34 age group (p<0.57) and significant for the 35-49 age group (p<0.04). While these results corroborate those of studies in Ghana and Ethiopia [9, 12], they contradict those of a study conducted in Nigeria, which found no statistically significant association between age level and ITN use [40].

Level of education is an important determinant of ITN demand. Women with primary, secondary and tertiary education were respectively 2.03, 2.55 and 3.08 times more likely to demand ITNs (p<0.00) than women with no education. These results indicate that the more educated a woman is, the more likely she is to demand ITNs. These results corroborate those of previous studies conducted in Nigeria, Zambia and Ethiopia, which found a statistically significant association between level of education,

knowledge and ITN use [9, 13, 14, 27, 40]. With regard to spouse, women having husbands of primary, secondary and tertiary education levels were respectively 2.2, 1.9 and 1.8 times more likely to demand ITNs (than women with husbands of no education with a statistically significant difference between the different education levels (p<0.00). These results contradict those of a study carried out in south-eastern Nigeria, which showed that educated husbands were adverse for her wife to demand ITNs because of discomfort [41]. Furthermore, in relation to marital status, single women were relatively more likely to demand ITNs than married women, with a statistically non-significant difference (OR=1.04; p<0.49). These results are in line with those of a study in Zambia, which found that being in a union was a factor in non-demand for ITNs among pregnant women [13]. On the other hand, these results contradict those of a study in Ethiopia indicating that the marital status of married women was associated with household demand for ITNs [11].

Compared with women's employment status, working women were 1.24 times significantly more likely to demand ITNs than unemployed women (p<0.00). These results corroborate those of a study conducted in north-eastern Uganda, which showed that a woman's occupation had a positive influence on her access to and use of ITNs [39], as well as those of studies in Ghana and Ethiopia, which found that a pregnant woman's employment status was a factor significantly influencing her demand for ITNs [9, 14]. In the same economic field, the results of this study show that the level of wealth and economic well-being is an important determinant of ITN demand among Cameroonian women. Indeed, compared with poorer women, poor middle-class, wealthy and very wealthy women were respectively 1.7 times, 2.2 times, 2 times and 2.6 times more likely to demand ITNs for malaria prevention, with a statistically significant difference (p<0.00) between quintiles of economic well-being among women. Thus, women in the poor, middle, rich and very rich income quintiles were more likely to demand ITNs than women in the very poor income quintiles. This result can be explained by the fact that the malaria control program targets almost all socio-economic strata of the population, so although it favours the vulnerable, women with middle or high incomes still have the opportunity to afford ITNs on the market. These results corroborate those of previous studies on factors associated with access to, use of and demand for ITNs for malaria prevention in certain endemic countries [9, 24, 33, 39].

With regard to media accessibility, women with access to the media were 1.4 times more likely to demand ITNs than women without access to the media, with a statistically significant difference (p<0.00). These results corroborate those of a study conducted in northwest Ethiopia, which found that reversing community misconceptions through information, education and communication (IEC) and behavior change communication (BCC) have improved the demand for ITN in the East Belessa district of Ethiopia [42]. The location of a woman's antenatal visit influences

the demand for ITNs. In fact, women who made their antenatal visits at a formal health center were 1.4 times more likely to demand ITNs than women who made their visits at a traditional birth attendant's settings. These results are similar to those of studies carried out in Ethiopia, which found that antenatal care attendance by pregnant women was a factor affecting demand for and use of ITNs [14, 25].

In terms of religion, women practicing Muslim, animist, no religion and other religions were less likely to demand ITNs than Christian women of all faiths, with a statistically significant difference (p<0.00). Similarly, in relation to area of residence, women residing in rural areas were significantly less likely (p<0.00) to demand ITNs than women in urban areas. This result corroborates those of a study carried out in Ethiopia, which showed that women living in urban areas were more likely to demand ITNs [42]. With regard to domestic violence, women who have experienced domestic violence seem to be more likely to request ITNs, with a statistically significant difference (p<0.00). Cameroon has ten regions, and there is also an association between demand for ITNs and women's region of residence. Women from the Adamaoua, East, Littoral, North, South and South-West regions were less likely to demand ITNs than women from the Central region, while women from the Far-North, West and North-West regions were more likely to demand ITNs than women from the Central region.

Conclusion

The aim of this study was to identify the economic and social determinants that impact ITN demand among women in Cameroonian households. The results show that the demand for ITNs is about 28.8% among women in this study, and it is still low compared with other developing countries. The study identified the economic and social determinants that influence demand for ITNs among women. Determinants relating to women, such as being employed, middle-class or wealthy in relation to economic well-being, being aged between 35-49, having a primary, secondary or higher level of education, having an educated husband, being single, seeking prenatal consultations in a formal health center, practicing the Christian religion, having access to the media, living in an urban area, being from the Adamaoua, Far-North, Littoral, South, and South West regions significantly influence the demand for ITNs by women in households in Cameroon. Health sector's public authorities should focus malaria control policy targeting women on strategies that can strengthen the economic and social determinants identified in this study, in order to boost demand for and use of ITNs in the country.

Ethical Approval: The study was conducted according to the guidelines of the Declaration of Helsinki, and ethical approval was obtained from the ethical review committee for the protection of human subjects and adult participants provided written consent for themselves and the assent forms were signed by parents of adolescents 15-21 years prior to enrolment.

References

1. World Health Organization (2022). World malaria report 2022. World Health Organization, Geneva, Switzerland, Licence: CC BY-NC-SA 3.0 IGO.

2. Gao L, Shi Q, Liu Z, Li Z, Dong X (2023). Impact of the COVID-19 Pandemic on Malaria Control in Africa: A Preliminary Analysis. Trop. Med. Infect. Dis 8: 67.

3. Chhim S, Piola P, Housen T, Herbreteau V, Tol B (2021) Malaria in Cambodia: A Retrospective Analysis of a Changing Epidemiology 2006–2019. Int. J. Environ. Res. Public Health18: 1960.

4. World Health Organization. World malaria report 2020: 20 years of global progress and challenges. World Health Organization.

5. Abate A, Assefa M, Golassa L (2022) Five-Year Trend of Malaria Prevalence in Mojo Town, Central Ethiopia: Shifting Burden of the Disease and Its Implication for Malaria Elimination: A Retrospective Study. Infection and Drug Resistance 15: 455-464.

6. Solanke BL, Soladoye DA, Birsirka IA, Abdurraheem A, Romoke Salau O (2023). Utilization of insecticide-treated nets and associated factors among childbearing women in Northern Nigeria. *Malar J* 22: 184.

7. The Global Funds (2023). Insecticide-Treated Nets Strategy 2023–2026. Supplier & Partner Meeting.

8. Malaria Consortium (2016). Malaria Prevention through Insecticide Treated Nets. Advocacy Brief. Malaria Consortium, Disease Control. Better Health. Malaria Consortium: London, UK.

9. Duut TB, Alhassan AR (2022) Factors associated with ownership of insecticide-treated nets for malaria prevention among pregnant women in Ghana. Public Health Toxicol 2:13.

10. Guinovart C, Sigaúque B, Bassat Q, Loscertales MP, Nhampossa T, et al. (2022). The epidemiology of severe malaria at Manhiça District Hospital, Mozambique: a retrospective analysis of 20 years of malaria admissions surveillance data. Lancet Glob Health 10: e873–81.

11. Seyoum D, Speybroeck N, Duchateau L, Brandt P, Rosas-Aguirre A (2017) Long-Lasting Insecticide Net Ownership, Access and Use in Southwest Ethiopia: A Community-Based Cross-Sectional Study. Int J Environ Res Public Health 14: 1312.

12. Mekuria M, Binegde DN, Derega J, Teferi Bala E, Tesfa B, et al. (2023). Insecticide-Treated Bed Net Utilization and Associated Factors Among Households in Ilu Galan District, Oromia Region, Ethiopia. Environ Health Insights 16: 11786302221078122.

13. Mwangu LM, Mapuroma R, Ibisomi L (2022) Factors associated with non-use of insecticide-treated bed nets among pregnant women in Zambia. Malar J 21: 290.

14. Tesfaye T, Mengistie Alemu B, Egata G, Bekele H, Taye Merga B, et al. (2022) Insecticide-Treated Nets Utilization and Associated Factors Among Pregnant Women in Miesso Woreda, Eastern Ethiopia: Observational Study. Int J Womens Health 14: 445-453.

15. U.S PMI (2022). Cameroon malaria profile. U.S. President's malaria initiative. USAID and CDC, Mai 2022.

16. MoPH (2022). District Health Information Software 2 (DHIS-2), SIS, Yaounde, Cameroon.

17. MoPH (2021). Annual Report 2021, National Malaria Control Program (NMCP), Yaounde, Cameroon.

18. National Institute of Statistics & ICF Macro, (2018). Cameroon: Fifth Demographic and Health Survey (DHS). Yaoundé, Cameroun.

19. Ngako Pamen JN, Njoumemi Z, Feubi PPE, Essi MJ, Tankeu YM, et al. (2022).Déterminants Sociodémographiques de l'Utilisation de la Moustiquaire Imprégnée d'Insecticide chez les Enfants de Moins de Cinq Ans au Cameroun. *HEALTH SCIENCES AND DISEASE 23*.

20. MoPH (2022). Annual Report 2022, National Malaria Control Program (NMCP), Yaounde, Cameroon.

21. Tangi LN, Ajonina MU, Moyeh MN, Chi HF, Ntui VN, et al. (2023) Knowledge, attitude, and adherence to malaria control guidelines and the prevalence of Plasmodium species infection in localities across transmission and ecological zones in Cameroon. Front. Public Health 11:1060479.

22. MoPH (2018). Cameroon's National Strategic Plan (NSP) for malaria control 2019-2023. Yaounde, Cameroon.

23. Mbida Mbida A, Akono Ntonga P, Awono Ambene P, Tchoffo R, Talipouo A, et al (2018). Insecticidal nets versus kdr-resistant mosquitoes. CurrTrends Entomol : CTET-106.

24. Zulu M, Chitundu K, Musenge EM, Chileshe M, Kalusopa V, et al. (2022). Utilisation of long-lasting-insecticide-treated nets among pregnant women and under-five children in selected sub-urban areas of Lusaka, Zambia. African Journal of Medical and Health Sciences 22: 19-27.

25. Nadew J, Obsa MS, Alemayehu A, Haji Y (2022). Utilization of insecticide treated nets among pregnant women in sodo zuria woreda Southern Ethiopia. Front. Trop. Dis. 3:926893.

26. Okafor CJ, Ogbonnaya NP. (2020) Knowledge, accessibility, and utilization of insecticide treated nets among pregnant women in a selected hospital in South-Eastern Nigeria. Eur J Midwifery 4: 48.

27. Teklemariam Z, Awoke A, Dessie Y, Weldegebreal F (2015) Ownership and utilization of insecticide-treated nets (ITNs) for malaria control in Harari National Regional State, Eastern Ethiopia. Pan Afr Med J 21:52.

28. Aung PL, Win KM, Show KL (2022) Utilization of insecticide-treated bed nets among pregnant women in Myanmar–analysis of the 2015–2016 Demographic and Health Survey. Plos one 17: e0265262.

29. Guntur RD, Lobo M, Amirul Islam FM (2023) Factors associated with the utilisation of mosquito nets amongst rural adults: A cross-sectional study in East Nusa Tenggara Province Indonesia. medRxiv.

30. Inungu JN, Ankiba N, Minelli M, Mumford V, Bolekela D, et al. (2017). Use of Insecticide-Treated Mosquito Net among Pregnant Women and Guardians of Children under Five in the Democratic Republic of the Congo. Malar Res Treat 5923696.

31. Kebede W, Tolcha A, Soboksa NE, Negassa B, Kanno GG, et al.(2023) Utilization of Insecticide-Treated Nets in Households for Under-5 Children and Associated Factors in East Mesekan District, Gurage Zone, Southern Ethiopia. Environ Health Insights 17: 11786302231164287.

32. Koenker H, Kumoji EK, Erskine M, Opoku R, Sternberg E, et al. (2023) Reported reasons for non-use of insecticide-treated nets in large national household surveys, 2009-2021. Malar J 22: 61.

33. Min KT, Maung TM, Oo MM, Oo T, Lin Z, et al. (2020). Utilization of insecticide-treated bed nets and care-seeking for fever and its associated socio-demographic and geographical factors among under-five children in different regions: evidence from the Myanmar Demographic and Health Survey, 2015–2016. Malaria Journal 19: 1-12.

34. Ameyaw EK (2021) Community and societal correlates of insecticide treated net use among pregnant women in sub-Saharan Africa: a multi-level analysis. *BMC Public Health* 21:1592.

35. Tassembedo M, Coulibaly S, Ouedraogo B (2018) Factors associated with the use of insecticide-treated nets: analysis of the 2018 Burkina Faso Malaria Indicator Survey. *Malar J* 20: 220.

36. Laxmi, Ngonghala CN, Bhattacharyya S (2022) An evolutionary game model of individual choices and bed net use: elucidating key aspect in malaria elimination strategies. R. Soc. Open Sci. 9: 220685.

37. Tetteh JA, Djissem PE, Manyeh AK (2023) Prevalence, trends and associated factors of malaria in the Shai-Osudoku District Hospital, Ghana. Malar J 22:131.

38. Yeboah D, Boah M, Adokiya MN (2023) Caregivers' use of insecticide-treated nets is associated with the use of ITNs by children under the age of five in Ghana. PLoS ONE 18: e0280065.

39. Akello AR, Byagamy JP, Etajak S, Okadhi CS, Yeka A (2022). Factors influencing consistent use of bed nets for the control of malaria among children under 5 years in Soroti District, North Eastern Uganda. Malaria Journal 21: 1-13.

40. Oridota ES, Onuoha SI, Sekoni AO, Akanmu ON, Olajide TO, et al. (2022) Knowledge and Utilization of Insecticide Treated Net among Antenatal Clinic Attendees of a Tertiary Hospital in Abuja, Nigeria. *University of Lagos Journal of Basic Medical Sciences 1*.

41. Eleazar C, Emenuga V, Udoh I (2022) Factors affecting usage of insecticide treated nets for malaria control by pregnant women in Enugu, South East Nigeria. *African Journal of Reproductive Health 26*: 76-81.

42. Yirsaw AN, Gebremariam RB, Getnet WA, Mihret MS *(2021)*. Insecticide-treated net utilization and associated factors among pregnant women and under-five children in East Belessa District, Northwest Ethiopia: using the Health Belief model. *Malar J* 20: 130.